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SALIENTIA OF VENEZUELA

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With One Plate

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INTRODUCTION

The following report contains an account of the frogs of the Venezuelan Republic. It is based mainly on the material collected by the author in Territorio Amazonas and belonging to the University of Puerto Rico (U.P.R.) and on specimens deposited in the Museum of Comparative Zoology at Harvard (M.C.Z.), the American Museum of Natural History (A.M.N.H.), the Chicago Natural History Museum (C.N.H.M.), the Museum of Zoology of the University of Michigan (U.M.M.Z.), the United States National Museum (U.S.N.M.) and the Museo de la Universidad Central de Venezuela (U.C.V.), but species reported in the literature and unavailable to the author for examination have also been included. The number of Venezuelan specimens studied comprises a total of about 1250. Twenty-four genera and ninety-six species are represented.

The paper as originally written included a description of the physiographical provinces of Venezuela and a short discussion of the fauna that each of them contains. For several reasons, it has been found more convenient to separate the two sections and give priority of publication to the taxonomic portion. It is hoped that the section on zoogeography will follow in the near future.

ACKNOWLEDGMENTS

I gratefully acknowledge the courtesies extended to me by members of the Venezuelan government, especially Col. Dn. Miguel Nucete Paoli, then Governor of Territorio Amazonas, and the secretary Dr. Luis Linares. Mr. Janis Roze, of the Universidad Central de Venezuela, not only has loaned me the frog collection of his institution but has provided valuable information on the localities and habits of the species included. For his courtesy I am more than appreciative.

I should be ungrateful if I did not express my appreciation to persons that helped me collect in the field: Mr. Ventura Barnés Jr., leader of the University of Puerto Rico Expedition to Venezuela, 1950, whose extensive knowledge of South American tropics made him a valuable advisor and guide; Dr. Jenaro Maldonado, entomologist and companion of several night searches for frogs and insects; Dr. Paul Nesbitt, anthropologist of the expedition; Dr. Hans Baumgartner of Puerto Ayacucho, a great friend of naturalists of Territorio Amazonas and a man with a great desire to help others. From the latter I received a number of specimens as well as his experienced cooperation in the field.

For the loan of specimens used in this study or for information regarding specimens under their custody, I am indebted to Mr. Charles Bogert and Mrs. Bessie Hecht of the American Museum of Natural History, Dr. H. Wermuth of the Berlin Museum, Dr. H. W. Parker, Miss A. G. Grandison and Mr. J. C. Battersby of the British Museum, the late Mr. K. P. Schmidt, Messrs. Clifford Pope and Hyman J. Marx of the Chicago Museum of Natural History, Drs. Norman Hartweg, Charles Walker and James A. Peters[1] of the Museum of Zoology of the University of Michigan, Dr. J. Guibé of the Paris Museum, the late Dr. E. R. Dunn of the Philadelphia Academy of Sciences, Dr. Robert Mertens of the Senckenberg Museum and Dr. Doris Cochran of the U.S. National Museum.

But my chief obligations for assistance in this work are to the late Dr. E. R. Dunn, Mr. Benjamin Shreve, Mr. Arthur Loveridge and Dr. Ernest Williams. Dr. Dunn placed at my disposal through letters and through personal conversation his immense knowledge of South American Amphibia, while Mr. Shreve, with his excellent taxonomic eye and accurate memory has helped me solve several problems that I would have been unable to solve myself. Mr. Loveridge and Dr. Williams not only have taken a personal interest in all the phases of my work, but have read the manuscript and suggested some changes. However, for the shortcomings of this paper the author assumes full responsibility. *Prostherapis dunni, Prostherapis shrevei, Hyla loveridgei* and *Eleutherodactylus williamsi* have been named after these four persons.

Hyla benitezi is dedicated to Dr. Jaime Benítez, Chancellor of the University of Puerto Rico, without whose efforts and interest the expedition (during the course of which many of the specimens here reported were collected) would never have been possible.

Finally, I am indebted to my wife for the bibliographical work, for typing the manuscript and for her constant help and encouragement during the course of this work.

HISTORICAL RÉSUMÉ

One of the earliest reports of Venezuelan amphibians is that of Lichtenstein and Martens (1856). Recorded as coming from Venezuela are: *Notodelphis ovifera* (= *Gastrotheca ovifera*),

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[1] Now at San Fernando Valley State College, Northridge, California.

Hyla palmata (= *H. boans*), *Hyla versicolor* (?), *Hylodes martinicensis* (= *Eleutherodactylus gollmeri*), *Crossodactylus Gaudichaudii* (?), *Cystignathus ocellatus* (= *Leptodactylus ocellatus*), *Cystignathus typhonius* (= *Leptodactylus sibilatrix*), *Bufo agua* (= *B. marinus*), *Bufo Leschenaultii* (= *B. guttatus*) and *Bufo strumosus* (= *B. granulosus*). *Phrynidium crucigerum* (= *Atelopus c. cruciger*) is described from Veragua. In 1863, W. Peters described *Hylodes gollmeri* on the basis of Lichtenstein and Marten's *Hylodes martinicensis.* I have been unable to determine the origin of this collection, but it appears that many of the specimens were collected by Consul Gollmer in the vicinity of Caracas. *Bufo guttatus* in all probability came from the southern forests or at least from the Orinoco Delta while *Gastrotheca ovifera* may be the specimen or specimens collected by Appun in Cumbre de Valencia (Ernst, 1877: 281). It was Dr. Dunn's opinion (letters, 1.7.51, 7.10.51) that this collection may have been mixed with one from Panama probably collected by Warschewitz (see remarks on page 173.)

Other important collections in the Berlin Museum were made by Appun, Salomón Briceño, Kumurow, Martin, Moritz, Otto, Rothe, Rosenberg, Wessel and Fisher. Less rich are the collections received from Brandt, Bancard, Eckermann, Effeldt, Ernst, Gundlach, Hagenbeck, Hübner, Klaebisch, Kummer, Mauss, Thivaites, Ursulauf, Valentiner and Lüning (Wermuth, letter 25.8.51). A small collection made by Carl Sachs in Ciudad Bolívar and Calabozo was reported on by Peters in 1877.

In 1892, O. Boettger reported on the frogs of the Senckenberg Museum, citing eleven Venezuelan species, all coming from Caracas and collected (except one) by Hübner and Schlesinger. In a later paper (1893), a group of seven Puerto Cabello (Coll. Mauss) and one "Venezuelan" (Coll. Schultzer) species were added to the list and in 1896, a report was made on 17 species collected by Hübner in the Alto Orinoco.

Most of the Venezuelan specimens reported by Günther, 1858, and Boulenger, 1882, were acquired by the British Museum from Brandt and Dyson, two Natural History dealers. Dr. Parker informs me (letter, 25.7.51) that he has not been able to discover if Brandt was ever in Venezuela. D. Dyson visited that country in 1851-60 and collected in Colonia Tovar, Valle de Aragua, La Guaira and Cariaco.

In 1877, A. Ernst published a book in which he devoted a paragraph to discussing the amphibians of Venezuela, mentioning four species and two additional genera without citation of species. Stejneger's report on the collections made by Lyons and Robinson in La Guaira and San Julián came out in the Proceedings of the U. S. National Museum for 1902. Apart from some separate descriptions and a short report by Boulenger on the frogs collected by Briceño in Mérida (1903), little was added to Venezuelan amphibiology between 1902 and 1927, when A. Lutz published his "Notas sobre batrachios da Venezuela e da Ilha de Trinidad." Until now this has been the most complete account of the Venezuelan frogs, and although it contains a few errors of interpretation, it is undoubtedly an important contribution and one that has been of great help in the present studies. Dr. Lutz's paper is based mainly on his own collections and observations in the region of Maracay. In the same year Roux published the description of *Hyla luteocellata* on the basis of two male specimens coming from El Mene in the Falcón State (Colls. Kugler and Vonderschmitt).

During more recent years other authors have mentioned a few species of frogs. Most important among these are Schmidt (1932), who reported on specimens from Mt. Turumiquire and vicinity (Coll. Blake), Parker (1936), who had specimens from the Upper Orinoco (Coll. Wavrin), Shreve (1947), who reported on the collection made by H. G. Kugler in Falcón State, Alemán (1952 and 1953) who had collections from the region of Baruta, El Hatillo and Kunana, respectively, and Walker and Test (1955) who described three species of *Eleutherodactylus* from Rancho Grande (Coll. Test).

The most noteworthy and until now unreported collections in the American museums are those of Baker (U.M.M.Z.; Carabobo, Yaracuy, Táchira); Barnés (C.N.H.M.; Yaracuy, Aragua, D. F.); Beebe (U.S.N.M.; Aragua, Monagas); Briceño (Mérida); Carriker (U.S.N.M.; U.M.M.Z., Mérida); Cherrie (U.S.N.M.; Bolívar); Holt (U.S.N.M.; Aragua, Miranda, D. F., Terr. Amaz.); Mondolfi and Vivas Berthier (U.S.N.M.; Aragua, Miranda, D. F., Falcón, Guárico); Osgood and Osgood and Conover (C.N.H.M.; Mérida); Pinkus (U.M.M.Z.; Roraima Region); Rosenberg (Mérida[2]); Tate and Tate and Carter (A.M.N.H.; Turumiquire, Duida and Roraima regions); Vogl (U.S.N.M., C.N.H.M.; Aragua); Schultz (U.S.N.M.; Maracaibo Basin); Weber (M.C.Z.; Bolívar); and Williamson, E. and J. (U.M.M.Z.; Carabobo, Yaracuy, Táchira).

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[2] Represented in most museums.

In 1942, E. Röhl published his "Fauna Descriptiva de Venezuela," which was revised in 1949. A few species of frogs are included and although there are several errors, the book furnishes common names and contains two records otherwise reported only by Ernst.

The Universidad Central de Venezuela has a good representation of native frogs, which has been mostly collected by the director of the museum, Dr. Racenis, and Mr. Janis Roze, a young instructor and enthusiastic curator of Herpetology. Most of the specimens come from Aragua, Distrito Federal and Guárico. Except for the types and paratypes, the tag numbers of the U.C.V. specimens should be considered provisional.

METHOD OF TREATMENT

The Venezuelan frog fauna, as known today, comprises 24 genera and 93 species. The discussion of each of them includes the Venezuelan synonymy and a description that, except when otherwise stated, is based strictly on Venezuelan material. Where specimens were not available, the original descriptions have been used. The contents of these have been slightly modified to suit my purpose but in no case (and no matter how poor the original) has the description been altered in meaning or the original remarks modernized in any way.

The group of specimens used in the writing of the description in each case is listed following the synonymy. Usually the specimens chosen for the description are from a single region. This has been done to insure the homogeneity of the sample described. Following the description of the species, measurements (in mm.) of a male and female are given, not necessarily of the largest, but of the best preserved specimens. Measurements of most of the specimens studied were recorded but it has not been considered desirable to publish them in the present report.

The list of localities includes those for the material deposited in the museums mentioned in the introduction of this paper as well as those given in the literature. When a specimen was not examined to my complete satisfaction (because it was temporarily missing from the shelves or for some other reason) its number is followed by an asterisk. The heading "Additional Localities" is used in each case to include records of specimens that have not been used in the description.

Following the list of localities is the range of the species. This includes the range within Venezuela and also other countries where the forms under consideration are said to occur. This last is based on the literature and on the specimens deposited in the different museums. Although representatives of many of the species occurring in the surrounding countries were carefully examined, in some instances it has been necessary to accept the records taken from the files.

A list of most of the localities mentioned in this paper, and a description of those where frogs have been collected is given at the end of the taxonomic section.

EXPLANATION OF TERMS AND MEASUREMENTS

The following is a list of the terms and measurements used in the text. A short explanation of amphibian terminology is given to help students who are beginning in this field, while Spanish equivalents are supplied in the belief that they may be of some value to the trained English-speaking specialist as well as to the Latin American student having little knowledge of English.

1. Head (cabeza). The head may be as long as broad (tan larga como ancha), longer than broad (más larga que ancha) or broader than long (más ancha que larga). The length is measured between the tip of the snout and the posterior margin of the tympanum, the breadth at the greatest distance between the tympana. When the tympanum is hidden the measurements are taken from or between the angles of the mouth. As the ratio of length to breadth can be easily found from the measurements given for each species, the character is only mentioned in the description when the difference from other species in this regard should be emphasized. In some cases, as in the genus *Leptodactylus* in general, and especially in *L. bolivianus* and *L. ocellatus*, the ratio of length to breadth is quite variable although the proportion given is the usual one.
2. Crests or ridges (crestas o aristas). Ridges that occur on the heads of some bufonids and hylids. The subnasal ridge (arista subnasal) is usually the semicircular prolongation of the canthal crest around the nostrils (*Bufo granulosus*). The canthal crest (cresta cantal) runs along the canthus rostralis; the orbitotympanic or supratympanic (orbitotimpánica o supratimpánica) lies above the tympanum, and the orbital (orbital) around the orbit. The latter may be divided into pre-, supra-, post- and infraorbital.

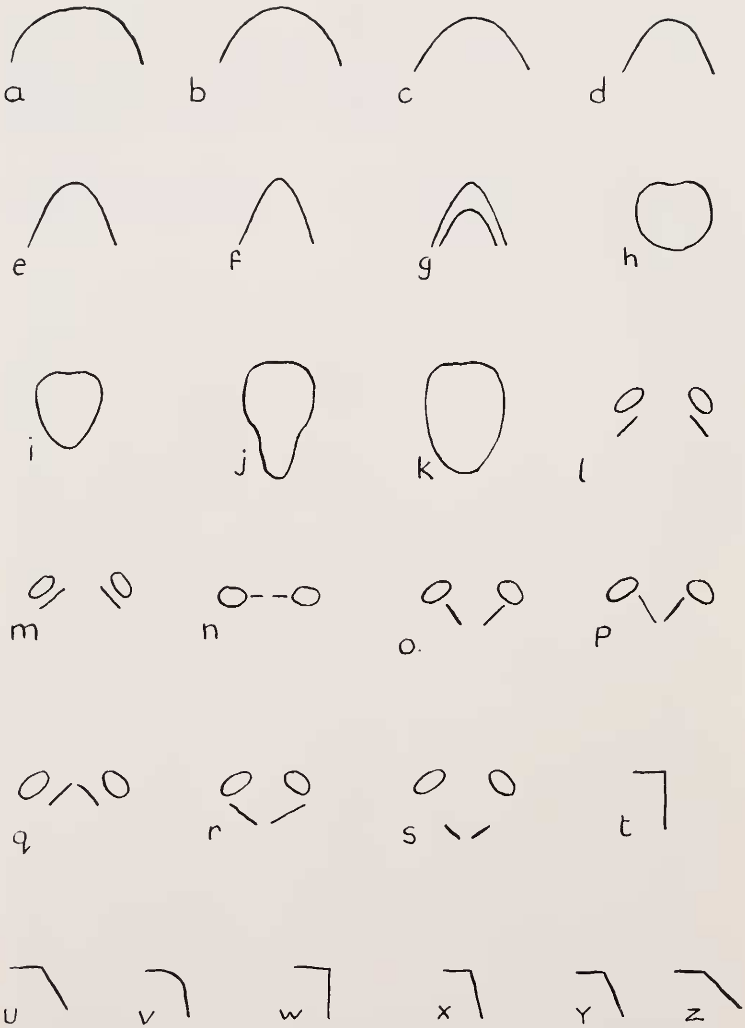

Fig. 1. a-g, shapes of snout; h-k, shapes of tongue; l-s, vomerine teeth; t-z, canthus and loreal region. See text pp. 11-16.

3. Snout (hocico). The snout may be semicircular (semicircular) as in Figure 1a, e.g. *Centrolene buckleyi;* almost semicircular (casi semicircular) as in Figure 1b, e.g. *Hyla marmorata;* rounded (redondeado) as in Figure 1c, e.g. *Hyla*

granosa or *Leptodactylus rugosus;* subovoid (subovoide) as in Figure 1d, e.g. *Leptodactylus pentadactylus;* subelliptical (subelíptico) as in Figure 1e, e.g. *Leptodactylus bolivianus;* or acuminate (acuminado, aguzado) as in Figure 1f, e.g. *Leptodactylus sibilatrix.* It may project over or overhang the mouth (saliente) in a shark-like fashion as in Figure 1g, e.g. *Leptodactylus sibilatrix;* be truncate (truncado), e.g. *Prostherapis trinitatis,* or swollen and elevated in front (hinchado y elevado al frente), e.g. *Hyla granosa* and *boans.*

4. Derm of the head involved in cranial ossification (piel de la cabeza comprendida en la osificación craniana). Easily recognized by determining if the skin is free from the cranium. *Gastrotheca ovifera* is a good example.
5. Tongue (lengua). With respect to form, the tongue may be circular or rounded (circular o redondeada) as in Figure 1h, e.g. *Centrolene buckleyi;* cordiform (cordiforme) as in Figure 1i, e.g. *Hyla tibiatrix;* pyriform or spatulate (piriforme o espatulada) as in Figure 1j, e.g. *Bufo guttatus;* or oval (ovalada) as in Figure 1k, e.g. *Leptodactylus bolivianus.* With respect to its breadth, it may be broad (ancha), e.g. *Hyla loveridgei,* or narrow and with parallel edges (estrecha y con márgenes paralelos), e.g. *Bufo granulosus.* It is free (libre) only when attached to the anterior part of the mouth, and adherent (adherente) when completely attached to the floor. When indented (indentada) behind, it is said to be emarginate (emarginada), nicked or notched (escotada, incisa), and when lacking the indentation, entire (entera).
6. Vomerine teeth or odontoids (dientes u odontoides vomerianos). In a series of two on the palate, in the vicinity of the posterior nares. They may be distinct (distintos) as in most species, indistinct (indistintos), e.g. *Pleurodema brachyops,* or absent as in *Bufo, Prostherapis* and some hylids. They may form different designs as in Figures 1l to 1p; between (entre) the choanae (choanas) as in Figure 1q; behind (detrás) them as in Figure 1r; or behind and between (detrás y entre) them as in Figure 1s.
7. Canthus rostralis (canto rostral). The ridge or angle formed between the eye and tip of the snout by the outer edges of the snout bones. It may be angular (angular) as in Figure 1t, e.g. *Bufo guttatus* (a right angle is implied); obtusely angular (angular obtuso) as in Figure 1u, e.g. *Hyla boans;* rounded (redondeado) as in Figure 1v, e.g. *Hyla minuta,*

indistinct (indistinto), or absent (ausente) where no external angle is formed and the snout would present a smooth, semicircular appearance if seen in cross-section.

8. Loreal region (región loreal, región frenal, mejilla [Espada]). The area bounded anteriorly by the nostrils, posteriorly by the eyes, dorsally by the canthus and ventrally by the upper lip. It may be straight or vertical (recto o vertical) as in Figure 1w, e.g. *Bufo guttatus;* almost vertical (casi vertical) as in Figure 1x, e.g. *Bufo typhonius;* little sloping or oblique (poco inclinado u oblicuo) as in Figure 1y, e.g. *Hyla misera* and *crepitans;* and oblique or sloping (oblicuo o inclinado) as in Figure 1z, e.g. *Hyla granosa.* It may also exhibit a depression (depresión) in which case it is concave or excavated (cóncavo o excavado) or be completely flat or non-concave (plano o no cóncavo). On occasions it may be slightly convex (un poco convexo).
9. Interorbital space equal, shorter or broader than an upper eyelid (espacio interorbital igual, más corto o más ancho que un párpado superior). The interorbital space is measured in the middle, between the two upper eyelids, the eyelid by depressing it slightly and measuring from the origin to the outer margin. When the space is said to be equal to the eyelid it can be expected to be slightly narrower or broader in some specimens. As definite numbers used in the comparison (e.g., interorbital space 1¾ times broader than an upper eyelid) are of no value in practice, and may even obscure the importance of other characters, they are used as little as possible in the text.
10. Eye diameter equal, shorter or longer than distance between eye and nostril (diámetro del ojo igual, más corto o más largo que la distancia entre el ojo y la nariz). The diameter of the eye is measured between the two corners, the distance between eye and nostril, between the anterior corner of the eye and the posterior of the nostril. When the diameter of the eye is as long as the snout (tan largo como el hocico) it is implied, of course, that it is also longer than the distance between eye and nostril. Only in genera where the character is variable and important, the comparative distance between nostril and eye and nostril and tip of the snout is given, e.g., nostril closer to the eye than to the tip of the snout (nariz más cerca del ojo que de la punta del hocico).

11. Metacarpal and metatarsal tubercles (tubérculos metacárpicos y metatársicos [Espada]). Since they are present in most species, they are only mentioned in the description where they are larger or smaller than usual or when they are modified in such a way as to be useful in the determination of the species. In some cases one or both of the metacarpal or metatarsal tubercles are absent.
12. Subarticular tubercles (tubérculos subarticulares, nudillos o pelotillas infra-articulares [Espada]). Found under the articulations of the digits and toes. Their mention is avoided if they lack any distinctive feature.
13. Web (palmeadura [Espada], membrana interdigital, membrana natatoria). Loveridge's system of measuring the amount of webbing by giving the number of free phalanges has been adopted here as it has the advantage of being standard, a feature that is absent in the other system (½ webbed, etc.). Since different authors use different fingers or toes or all of them to determine the amount of webbing, it is difficult to make a general comparison, but in general it can be said that Boulenger's ⅔ webbed fingers have 1½ free phalanges on the outer finger, his ½, 2 and his ⅓, 2½. When present, the disk contains the outer phalanx. For measuring the number of free phalanges, the fingers and toes are placed close together and the extension of the web is determined by considering the middle, not the margins of the membrane. The web of the first finger is that between the first and second fingers, of the second, that between second and third, of the third, that between third and fourth and of the fourth, that between third and fourth also but in relation to the fourth.
14. Lateral fringes of toes and fingers (margen cutánea de los dedos de los pies y las manos). This character seems to be quite valuable in some cases. When said to be faintly indicated, the fringes may be completely absent in some specimens. On the other hand, a species that does not normally show lateral fringes may show some indication of them in a badly desiccated state. Allowance should be made for such cases. In a few species, e.g., *Leptodactylus podicipinus*, there are lateral flaps that may go around the toe for ¼ of its circumference.
15. Tarsal fold (repliegue társico). A cutaneous fold or ridge that extends usually obliquely along part or all the length of

the tarsus. In some species, e.g., *Pseudopaludicola pusilla*, the tarsal fold begins with a tubercle in the middle of the tarsal segment.

16. Metatarsal fold (repliegue metatársico). A slight skin fold or close line of tubercles that extends along the outer margin of the metatarsal segment and outer toe.
17. Hidden portions of the hind limbs (porciones ocultas de las extremidades posteriores). Those parts of a frog's hind limb that cannot be seen from above or below when the animal is in the resting position.
18. Heel of the adpressed hind limb extends to the shoulder, the tympanum, the eye, the nostril, the tip of the snout (la extremidad posterior extendida a lo largo, el tobillo llega a el hombro, el tímpano, el ojo, la nariz, la punta del hocico). Obtained by stretching the hind limb anteriorly and determining the place to which the tibio-tarsal articulation extends. Sometimes a valuable character although it should not be interpreted too closely. A broken limb bone alters the heel extension completely.
19. Secondary sexual characters (caracteres sexuales secundarios), as the hooks or rugosities on the inner finger of some males, the breast spines of *Leptodactylus pentadactylus*, the chin spines of *Leptodactylus rugosus*, the swollen arms of *Leptodactylus ocellatus*, the external vocal pouches of many species, the longer arms of the male *Atelopus oxyrhynchus*, the snout ridge of *Leptodactylus mystaceus*, the tubercular dorsum of the male *Hyla taurina*, etc. Most of these characters are only shown by the males during the breeding season.

Key to the Families of Venezuelan Frogs

I. Vertebrae convex anteriorly, concave posteriorly (opisthocoelous); sacrum fused with the urostyle.
    Eustachian tubes opening through one orifice into the pharynx; tongue and eyelids absent . . . . PIPIDAE

II. Vertebrae concave anteriorly, convex posteriorly (procoelous); sacrum articulated with the urostyle by two condyles.
    A. Right and left half of the pectoral girdle overlapping, movable (arciferal).
        1. No small cartilage (intercalary) between the last and penultimate phalanges; terminal phalanges simple or T-shaped; transverse processes of the sacral vertebrae (sacral diapophysis) cylindrical or dilated; belly smooth or granular.
            a. Omosternum absent, parotid gland present, upper jaw not toothed . . . . BUFONIDAE

b. Omosternum present, parotid gland absent or small and inconspicuous; upper jaw toothed .... LEPTODACTYLIDAE

2. A small piece of cartilage (intercalary) between the last and penultimate phalanges; transverse processes (sacral diapophysis) of the sacral vertebrae generally dilated; belly granular; toes generally webbed.

a. Terminal phalanges T-shaped, astragalus and calcaneum fused .... CENTROLENIDAE

b. Terminal phalanges claw-shaped, astragalus and calcaneum not fused .... HYLIDAE

3. An accessory phalanx in digits; terminal phalanges simple (*Pseudis*), or claw-shaped (*Lysapsus*); transverse processes (sacral diapophysis) of sacral vertebrae cylindrical; toes webbed .... PSEUDIDAE

B. Right and left half of the pectoral girdle fused in the middle, immovable (firmisternal).

1. Omosternum present; sternum cartilaginous; fingers and toes with dermal scutes on the disks .... DENDROBATIDAE

2. Omosternum absent; sternum bony; fingers and toes without dermal scutes on the tips .... ATELOPODIDAE

III. First seven vertebrae procoelous; 8th biconcave, sacral, biconvex (diplasciocoelous), articulated with the urostyle by two condyles.

A. Teeth present, palate normal .... RANIDAE

B. Teeth absent, palate with two dermal ridges in front of the pharynx .... MICROHYLIDAE

PIPIDAE

Key to the Species of Pipa *Recorded from Venezuela*

I. Two lateral flaps at the angle of the mouth; one large metatarsal tubercle .... *pipa*

II. Lateral flaps at the angle of the mouth absent; no metatarsal tubercles .... *parva*

Pipa pipa (Linné)

Rana pipa Linné, 1758, Syst. Nat., ed. 10: 210: Surinam.
Pipa dorsigera Ernst, 1877, Flora y Fauna de Ven.: 281.
Pipa pipa Dunn, 1948, Amer. Mus. Novit., no. 1384: 9.
Pipa americana Röhl, 1949, Fauna Descr. de Ven., ed. 2: 395, fig. 177.

No Venezuelan material examined.

1 (M.C.Z. 6127) Trinidad.
3 (M.C.Z. 1244) Dutch Guiana.

Description. Head flattened, openly triangular but with a blunt tip; nostrils transversely elongated, sometimes with a slightly elevated piece of skin at the outer edges; a short tentacle under the tip of the snout; mouth very large, with two distinct lateral flaps at its angles; one or more short, pointed appendages above the small eyes and sometimes another pair on each side of the snout under the upper lip; fingers long and slender, each ending in four tips; metacarpal tubercles absent; thighs very short; a very prominent inner metatarsal tubercle but no outer; toes broadly webbed to the tips. Skin above, shagreened and with small round tubercles and lateral line organs. Below, rugose.

Measurements. Snout-vent ♂ 135, ♀ 120.

Additional Localities. A group of petroleum geologists (López, Davey y Rubio, 1946: 123) have observed this species in the Delta Region. Ernst and Röhl do not give any special locality.

Range. Eastern Venezuela. Trinidad and the Guianas to Matto Grosso; Colombia to Perú and probably Bolivia.

Remarks. According to Röhl the common name in Venezuela is "sapo de celdas."

PIPA PARVA Ruthven and Gaige

Pipa parva Ruthven and Gaige, 1923, Occ. Papers Mus. Zool. Univ. Mich., No. 136: 1: Sabana de Mendoza, Venezuela; Noble, 1925, Amer. Mus. Novit., No. 164: 2; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 41, pl. viii, fig. 1; Dunn, 1948, Amer. Mus. Novit., No. 1384: 8.

Protopipa parva Carvalho, 1939, Bol. Biol., *4*: 397, figs. 6b, 6c.

1 (U.M.M.Z. 55743, type) Sabana de Mendoza.
4 (U.M.M.Z. 57444-57447, prtps.) Sabana de Mendoza.
1 (M.C.Z. 9012, prtp.) Sabana de Mendoza.
47 (U.S.N.M. 115770-816) 20 km. w. Rosario, iii.42.

Description. Head depressed; snout rather pointed and projecting beyond the mouth; nostrils transversely elongated, ending laterally in two projecting tips; eyes small, their diameter much shorter than distance between eye and nostril; interorbital space broad; no dermal appendages at the tip of the snout nor in any other place on the head; arms relatively short; fingers short, with a small basal web, each ending in four short appendages; metatarsal and subarticular tubercles absent; toes fully webbed, their tips pointed; tarso-metatarsal articulation of the adpressed hind limb extends to the eye or between eye and nostril. Skin above, uniformly covered with keeled tubercles. Below, tubercular except on the lower lip.

Color. Grayish brown, tinged with yellowish and with obscure darker markings. Below, brownish yellow.

Measurements. Snout-vent ♂ 29, ♀ 34; head breadth ♂ 13, ♀ 9.5; head length ♂ 7, ♀ 6; femur ♂ 12.5, ♀ 12.3; tibia ♂ 13.5, ♀ 13.

Habits. Females with swollen backs were found to be gravid. Apparently some hormone (?) stimulates swelling prior to spawning. Some specimens only 11 mm. in length had swollen backs.

Additional Localities. El Mene, in a roadside puddle that drains into Río Cocuiza (U.S.N.M. 115818-20); Lagunillas (U.S.N.M. 11757-8); Río San Juan (U.S.N.M. 115767-9); Zulia (U.S.N.M. 128845, juv.).

Range. The arid and semiarid Maracaibo Basin and the Falcón Region. Northeastern Colombia.

Remarks. This species represents the only frog that is apparently endemic to the arid and semiarid region of northwestern Venezuela. It seems to be most closely related to *Pipa aspera* of the Guianas, but apparently there is complete discontinuity of their ranges. It is possible that in previous times an ancestral form occupied all the area from the Maracaibo Basin to the Guianas and that the range was broken by the changes that occurred during the Ice Age. Living in a medium of high specific heat, this mostly aquatic animal was able to persist in the Maracaibo Basin while failing to survive in the Coastal Range owing to the peculiar conditions existing there at the time.

I agree with Dunn (1948) in including the genera *Pipa, Protopipa* and *Hemipipa* in the single genus *Pipa.*

BUFONIDAE

Key to the Species of Bufo *Reported from Venezuela*

I. Head without bony ridges.[1]
    A. Snout truncate; canthus angular; a wedge-shaped, skin-covered ridge in front of the eye .... *g. guttatus*
II. Head with bony ridges.[1]
    A. Upper eyelid with a hornlike dermal appendage.
        1. A lateral fringe of pointed tubercles; snout with a triangular tip .... *ceratophrys*
    B. Upper eyelid normal.
        1. A subnasal ridge; tympanum in contact with the descending ramus of the postorbital ridge; nostrils directed upward; heel never extending to parotid .... *g. granulosus*
        2. No subnasal ridge; tympanum not usually in contact with the descending ramus of the postorbital ridge; nostrils lateral or almost so; heel generally extending to parotid or beyond.

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[1] This character does not usually work for young specimens. Such juveniles should be closely examined for the presence or absence of the supraorbital ridge. The use of the other key characters may also be necessary.

- a. Angles of the jaw not projecting.
  - 1. Tarsal fold strong; snout not prominent, gradually inclined downward toward the front .... *m. marinus*
  - 2. Tarsal fold absent; snout prominent, not gradually inclined downward toward the front.
    - a. Palms and soles spinulous; metatarsal fold absent .... *sternosignatus*
    - b. Palms and soles not spinulous; metatarsal fold present .... *typhonius alatus*
- b. Angles of the jaw strongly projecting; palms and soles not spinulous; metatarsal fold present .... *t. typhonius*

BUFO GUTTATUS GUTTATUS Schneider

Bufo guttatus Schneider, 1799, Hist. Amphib., *1*: 218: "India Orientali"; Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

Bufo Leschenaultii Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 42.

7 (U.P.R. 30-36) Pto. Ayacucho, v.50.
4 (U.P.R. 37-40) Tapara, vi.50.
5 (U.P.R. 42-46) Raudal de Dios, v.50.
2 (U.P.R. 41, 47) La Culebra, 1,000 ft., v.50.
1 (M.C.Z. 17708) Sn. Fernando, 1895.

Description. Snout truncate, as long as, or very slightly longer than, the eye diameter; tongue pyriform, entire or slightly nicked behind; eye diameter greater than distance between eye and nostril; interorbital space flat, about twice as broad as an upper eyelid; canthus angular; loreal vertical, flat; tympanum distinct, ½ the eye diameter; a wedge-shaped, skin-covered ridge in front of the eye; other head ridges absent; sometimes the slight but thick supratympanic eminence appears to be an anterior extension of the parotid; parotids large, distinct, pitted, extending on the sides as far down as the lower margin of the tympanum; first finger much longer than second; fingers and toes swollen at the tips, with a thick but not very distinct lateral fringe; subarticular tubercles large, single, rounded, that of the first finger larger than the others; tarsal fold fairly prominent; metatarsal fold absent; inner metatarsal tubercle very prominent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1¼, 1, 2, 3¾, 2; heel of the adpressed hind limb extends to the posterior margin of the parotid. Skin on the posterior part of the dorsum with numerous flat and very distinctive warts; flanks and limbs warty; a series of 3 or 4 transverse rugae at the nape; a loose fold of skin on each side of the body from parotid to groin; ventral surfaces of the belly and thighs rugose and with flat warts or granules.

Color. Above, olive or wood-brown with orange brown warts; limbs, flanks and sides of the head blackish or brownish gray; parotids particolored. Below, brownish gray, uniform or more usually with scattered, round, white spots; lower jaw generally margined with white dots; limbs occasionally exhibiting dark blotches on the ventral surfaces.

Measurements. Snout-vent ♂ 47, ♀ 85; head breadth ♂ 15, ♀ 24.5; head length ♂ 14.1, ♀ 23; femur ♂ 16, ♀ 27; tibia ♂ 14, ♀ 26.

Habits. Like *B. typhonius* with which it is usually found, this species apparently prefers the leaf-covered floors of wooded areas. Unlike *B. t. typhonius,* however, it seems to be more partial to lower grounds, the species ceasing to occur at about 400 m. on the Marahuaca region, where *B. typhonius* is still abundant.

The six largest adult females (U.P.R. 30-36) were collected at night while they were crossing a road after a heavy rain. Their ovaries were completely undeveloped.

Additional Localities. Upper Orinoco (Boettger, 1896); Venezuela (Licht. and Mart., 1856).

Range. The Venezuelan Guayana and probably the Delta Region. The Guianas to northern Brasil and with all probability southeastern Colombia.

Remarks. The label with the type specimen (Berlin 3517) indicates that it was collected in Surinam by Bloch. Although the locality records are not sufficient to draw any final conclusions, I consider *Bufo glaberrimus* and *Bufo guttatus* sufficiently close structurally to be regarded as conspecific. To avoid the use of a racial name until the intergradation is confirmed appears as undesirable as to make premature use of the trinomial. These two forms are apparently not separated by any physical or faunal barrier, their ranges are allopatric and the differences they exhibit appear to be of racial value.

Bufo guttatus guttatus is apparently very sensitive to changes of latitude and altitude (see ''Habits'' and ''Range'' above) and it is possible that these factors have contributed in differentiating *glaberrimus* although this animal is found as low as 500 m. in Colombia and Ecuador. It is distinguished from typical *guttatus* by the absence of preorbital ridges and in having a longer hind limb, the heel usually extending to the anterior half of the parotid. The skin is smooth in both forms up to a size of 35 or 40 mm. when the flat, rounded warts appear. These are generally more orange in *guttatus* than in *glaberrimus.* I have not discovered any difference in webbing between the two forms.

The rose spot in the inguinal region described by Günther for *B. glaberrimus* is found in a specimen from Macanal, Colombia (M.C.Z. 15059, 68 mm.) but not in those from Sarayacu, Ecuador (M.C.Z. 19603-12 plus 56 dupl., largest 53½ mm.). The latter are generally dark in the anterior part of the belly and throat but the white round spots that occur in some *B. guttatus* are sometimes present in *B. glaberrimus.*

M.C.Z. specimens 3807-8, 2968 (largest 51½ mm.) from Salidero, N. W. Ecuador undoubtedly represent a race, distinguished by the variegated dorsum, greater amount of web and densely dotted ventral surface. It is not impossible that they represent the immature condition of the recently described *Bufo blombergi* Myers and Funkhouser, which might also be included in the same Rassenkreis. Boulenger (1882) mentions a *Bufo guttatus guttatus* of 177 mm. (Demerara), so it appears that the species in general may attain considerable size. Besides its normally large size, however, *Bufo blombergi* is distinguished from *glaberrimus* by several minor differences, and geographically it is disjunct, being separated by the whole Andean Range.

I believe *Bufo anderssoni* Melin (Taracúa, Uaupés R., Brasil) is a synonym of *Bufo guttatus guttatus.* This would appear from the ridge in front of the eye shown in one of the figures.

BUFO CERATOPHRYS Boulenger

Bufo ceratophrys Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 319, pl. xii, fig. 2: Ecuador.

1 (U.P.R. 253, juv.) Temiche, 4050 ft., v.50.

Description. Snout with a pointed triangular tip; nostrils somewhat raised laterally; tongue narrow, entire; eye diameter greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus well defined; loreal almost straight; tympanum hidden; probably slight supraorbital and supratympanic ridges; parotids moderate, subovate, superficial; first finger a little shorter than second; a moderate metatarsal fringe to the tip of the outer toe; subarticular tubercles large; toes webbed at the base only; heel of the adpressed hind limb extends to the eye. Skin above covered with small tubercles; three distinct tubercles at the angle of the mouth and several others at the ventral base of the arm; upper eyelid with a triangular dermal appendage; a lateral fringe of tubercles from parotid to groin.

Color. Above, brown with minute dark points and a dark spot on one of the sides of the dorsum; fringes along the sides of the body black-edged; limbs crossbarred. Below, uniformly light brown.

Measurements. Juv., snout-vent. 12 mm.

Habits. The only specimen was collected at night on the leaf-covered floor of very humid forest.

Range. Only known from Marahuaca in Venezuela. Eastern face of the Andes of Ecuador.

Remarks. Although very small, the specimen shows sufficient characters for its proper allocation to the species. It differs from two Ecuadorean specimens examined (M.C.Z. 19601-2, Canelos to Marañón) and from the original description in having the first finger shorter than the second, a hidden tympanum and no well-developed lateral papillae. The last two characters are probably a sign of immaturity as the smaller of the Ecuadorean specimens is similar in these respects.

So far as I am aware, the species has not been reported from the Amazonian forests between the Guayanan Cerros and the Andes. It represents the first Guayanan frog showing Andean affinities and a confirmation of similar findings in plants, birds and mammals. More abundant and adequate material of *Bufo ceratophrys* may possibly show some racial differentiation from the Andean form.

BUFO GRANULOSUS GRANULOSUS Spix

Bufo granulosus Spix, 1824, Spec. Nov. Testud. Ran.: 51, pl. xxi, fig. 2: Bahía; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 39; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42, pl. viii, figs. 5, 6; Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 1.

Bufo strumosus Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 42.

Bufo granulosus granulosus Müller and Hellmich, 1936, Wissen. Ergeb. Deutsch Gran Chaco Exped.: 13.

13 (U.P.R. 16-28) Sn. Fernando de Atabapo, vi.50.
1 (U.P.R. 29) Pto. Ayacucho, vi.50.

Description. Snout prominent, slightly longer than the eye diameter; nostrils directed upward; tongue narrow, entire; eye diameter greater than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus curved, defined by a horny ridge that extends anteriorly as a semicircle around the nostril; loreal slightly oblique; tympanum moderate, the anterior border in contact with the postorbital ridge, the posterior margin usually obscured by granules; orbits encircled by a low but distinct, horny ridge; a horny labial and a short supratympanic ridge; parotids of moderate size but not distinctly marked; first finger not extending beyond second; a rounded palmar and a smaller and less distinct inner metacarpal tubercle; subarticular tubercles single, the second of the third finger double; edges of fingers and toes serrated; tarsal and metatarsal folds absent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1⅓, 1⅓, 2-2½, 3¾, 1¼-2; heel of the adpressed hind limb does not reach the parotid. Skin above, tubercular, spiny on the sides and limbs. Male with a subgular vocal sac, and dark rugosities on the inner side of the first digit.

Color. Above, light brown or yellowish gray, with irregular dark gray markings; head ridges black. Below, yellowish gray, usually marbled with darker gray on the breast and anterior part of the belly.

Measurements. Snout-vent ♂ 46.7, ♀ 52; head breadth ♂ 14.5, ♀ 16; head length ♂ 12.1, ♀ 14; femur ♂ 10, ♀ 13; tibia ♂ 13.5, ♀ 17.

Habits. Most of the specimens were caught in amplexus in the shallow waters of a rain pool in the savannas of San Fernando. It is strange that while the *B. marinus* collected in the same locality were heavily infested with *Amblyomma dissimile*, not one of the *B. granulosus* was attacked by this tick.

Of three stomachs examined, one was empty, one contained five small snails, mud, two small stones and a piece of wood. The other had one ant, one small hemipteran and three or four pellets of unidentifiable remains.

Additional Localities. Arabopó (U.M.M.Z. 85131-2, 85133[2], 85134[2]); Caracas (U.C.V. 100; Boettger, 1892); Espino (U.C.V. 68); Lake Maracaibo (C.N.H.M. 3016[2]); Maracay (U.S.N.M. 97193-5; Lutz, 1927); Parmana (U.C.V. 10); Pto. Cabello (Licht. and Mart., 1856); Sanariapo (U.S.N.M. 80641-50); Upper Orinoco (Parker, 1936); Venezuela (Licht. and Mart., 1856).

Range. The arid and semiarid Maracaibo Basin, the northern coastal belt, the arid and semiarid sections of the Coastal Range, the Llanos and the northern half of the Venezuelan Guayana. Colombia and the Guianas to northern Argentina.

Remarks. The specimens from Arabopó (4000 ft.) have very prominent crests and perhaps should deserve racial recognition.

BUFO MARINUS MARINUS (Linné)

Rana marina Linné, 1758, Syst. Nat., ed. 10: 211: America (Restricted to Surinam by Müller and Hellmich, 1936).

Bufo agua Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 42; Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 65.

Bufo marinus Peters, 1877, Monatsb. Akad. Wissensch. Berlin: 460; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 315; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 39; 1893, Ber. Senckenb. Naturf. Ges.: 40; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Stejneger, 1902, Proc. U. S. Nat. Mus., *24*: 180; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42; Alemán, 1952, Mem. Soc. Cienc. La Salle, *12*: 27, fig. 3.

Bufo marinus marinus Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., 18: 159.

7 (U.P.R. 48-51, 76-7, 89) Sn. Fernando de Atabapo, vi.50.

1 (U.P.R. 52) Chorro Chupadero, iii.50.

Description. Snout slightly longer than the eye diameter; tongue oval or pyriform; eye diameter greater than distance between eye and nostril; interorbital space about 1½ times as broad as an upper eyelid; canthus well defined, slightly curved and sloping toward the front; loreal short, almost vertical; tympanum not very distinct on the posterior margin, ½ to ⅔ the eye diameter; head ridges well defined, the infraorbital extending obliquely to the angle of the jaw, the parietal variably distinct; a few tubercles behind the angle of the jaw; parotids large, pitted, obliquely subtriangular; a longitudinal series of tubercles from hand to elbow; first finger longer than second; a very large, flat palmar and a smaller inner metacarpal tubercle; subarticular tubercles generally single or incompletely fused, the second of the third finger double; tarsal fold strong; metatarsal absent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1, 1 to 1⅔, 2, 3 to 3¾, 1½ to 1¾; the web is extended to the tips as distinct lateral fringes; heel of the adpressed hind limb extends to the parotid. Skin above and on the flanks covered with warts of irregular size; upper eyelids and sides of the head tubercular; ventral surfaces granular, the granules being sometimes tipped with a dark corneus matter. Male with a rugosity on the inner side of the first digit.

Color. Above, brown with irregular lighter and darker markings. Below, light brownish or yellowish, generally marbled with gray.

Measurements. Snout-vent ♂ 44, ♀ 79; head breadth ♂ 15, ♀ 26; head length ♂ 14, ♀ 24; femur ♂ 16, ♀ 32; tibia ♂ 17, ♀ 35.

Habits. B. marinus seems to be fairly common along the Orinoco River where its voice was often heard at night. Its presence was not detected in the Cunucunuma nor in the Upper Duida and Marahuaca regions.

Several of the specimens collected in Sn. Fdo. de Atabapo were infested with the tick *Amblyomma dissimile.* One of the animals had been so emaciated by the infestation that for a while it was taken for some other form.

Male and female specimens were collected in a shallow rain pool together with *B. granulosus.* While most of the *B. granulosus* were in amplexus, the ovaries of the adult *B. marinus* were completely undeveloped.

Additional Localities. Río Albarregas (A.M.N.H. 10501) Arabopó (U.M.M.Z. 85120[3]); Barrancas (M.C.Z. 19916, juv.); Baruta (Alemán, 1952); Calabozo (Peters, 1877); Campo del Lago, Lagunillas (U.S.N.M. 115692-8); Caracas (Boettger, 1892); Ciudad Bolívar (M.C.Z. 19114, 19 juv.); Cocollar, Cumaná, Cumanacoa (Schmidt, 1932); Duida Region (A.M.N.H. 32962); El Periquito (U.C.V. 89); El Valle (U.S.N.M. 128850-2); Espino (U.C.V. 50); Kunana, Perijá Mts. (Alemán, 1953); La Fría (U.M.M.Z. 55585*); La Guaira (U.S.N.M. 22537-8, 27800-1, 27803-6, 27796); Macuto (U.C.V. 77-8*); Maracay (U.M.M.Z. 52707-8*, Lutz, 1927); 30 km. of Maturín (U.C.V. 76); Petare (U.S.N.M. 121170); Pto. La Cruz (U.S.N.M. 121171-2); Pie del Cerro U.S.N.M. 121168); Puerto Cabello (Boettger, 1893); Sn. Antonio (U.S.N.M. 836119); Sn. Carlos (U.S.N.M. 83610); Sn. Fernando de Atabapo (U.S.N.M. 80651); Sn. Julián (U.S.N.M. 27807); Sta. Catalina (M.C.Z. 19915, 4 juv.); Sta. Elena, Bolívar (U.M.M.Z. 85121); Sta. Lucía (U.S.N.M. 121169); Tanaguarena (U.C.V. 36); Turgua (Alemán, 1952); Turgua (U.S.N.M. 129265); Upper Orinoco (Boettger, 1896); Venezuela (C.N.H.M. 43664? [3-6 juv.]; U.M.M.Z. 55583-4*; Lichtenstein and Martens, 1856; Günther, 1858; Boulenger, 1882).

Range. Probably all the physiographical provinces of Venezuela including the Andes to an elevation of 1,600 m. Texas to northern Brasil.

Remarks. No constant difference in size of parotid between specimens from northern and southern Venezuela was observed. While those of the southern animals are generally of a large size, some of the northern specimens (U.S.N.M. 121165, 121171, 27800) have glands that rival in volume any of those of the Amazonian group, with the possible exception of the larger southern specimen, an animal from San Antonio having a snout-vent length of 142 mm.

The coloration of U.S.N.M. 83610 (131 mm.) is unusual: the ventral surfaces, the under sides of the parotids, the lower jaw and the posterior part of the thighs are bright yellow and dark marbled while the throat is profusely infuscated, almost black. Dr. Cochran and I have agreed that this specimen represents *B. marinus* but in coloration it is not very different from a British Museum Pto. Cabello specimen that has been referred to *B. crucifer* (Blgr., 1882: 317, a or b). I have examined this latter animal but have excluded the species from the fauna of Venezuela until its presence is confirmed by further material.

The male *Bufo marinus* is more tubercular above, the tubercles are more spiny, and the color is usually more uniform than in the female.

Cochran, 1955, treats *Bufo paracnemis* and *Bufo ictericus* as distinct species, on the ground that the two overlap in part of their ranges (Río de Janeiro and Sao Paulo). On the east, *B. paracnemis* is said to occupy the intermediate area between northern *B. marinus* and southern *B. ictericus,* occurring in Brasil in Minas Gerais, Bahía and Pernambuco.

To the west the southward extension of *Bufo marinus* is uncertain, as records may refer to any of the related forms. However, it does not appear impossible that *Bufo marinus* may have given rise to *paracnemis* on the east and *ictericus* on the west, and that these two forms may have come together after their independent origin from a common ancestor. Anyway, there does not appear so far to be sufficient evidence against considering *paracnemis* a race of *Bufo marinus* and on that basis the trinomial is used here.

Bufo marinus andinensis Melin, 1941, was described from Roque, Perú.

Bufo pythecodactylus Werner is considered a synonym of *Bufo marinus marinus.*

Bufo sternosignatus Günther

Bufo sternosignatus Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 68, pl. vi, fig. c.: Pto. Cabello, Venezuela; Córdova, Mexico (restricted to Venezuela by Boulenger, 1882); Boulenger (part?), 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 323; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 39; Günther, 1901, Biol. Centr. Amer., Rept. and Batr.: 247; Nieden, 1923, Das Tierreich Anura. I: 182; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42, pl. viii, figs. 3, 4.

Bufo typhonius sternosignatus Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 535.

2 (M.C.Z. 17812-3) Distrito Acosta, 29.
1 (M.C.Z. 26151) Cerro Cosme, x.39.
3 (M.C.Z. 26152, 25976-7) Paují, v. 45.
3 (U.M.M.Z. 55690-3) Sn. Esteban.
1 (U.M.M.Z. 55694) Río Bejuma.
2 (U.M.M.Z. 55695-6) Río La Mona.
1 (U.M.M.Z. 55697) Bet. Valencia and Caserío Silva.
1 (U.C.V. 16) Carayaca, xii.51.
1 (U.C.V. 28) Cerro Avila, viii.51.

Description. This species is very similar to *Bufo typhonius alatus,* from which it can be distinguished by the following characters: snout not very prominent; orbital ridges slight, the supratympanic usually well developed, the parietal absent or very indistinct; parotids subovate, not generally pointed posteriorly; hands and feet spinulous; the subarticular tubercles not different from the other spinules of palms and soles; metatarsal fold absent; heel of the adpressed hind limb extends to the posterior half of the parotid. Skin above and below very granular, occasionally coarse and spinulous especially on the sides of the body and venter. A lateral fringe of tubercles is found in some but not all individuals.

Color. This animal is usually of a reddish color when alive. In alcohol it turns brown and many specimens present a coloration very similar to that of *B. typhonius.* Some specimens are peculiarly marked with yellow and brown below.

Measurements. Snout-vent ♂ 41, ♀ 49; head breadth ♂ 14, ♀ 16; head length ♂ 12, ♀ 14; femur ♂ 16.5, ♀ 18; tibia ♂ 16, ♀ 18.

Habits. Apparently a forest animal.

Additional Localities. Caracas (Boettger, 1892); El Limón (U.S.N.M. 121173-4); Mamo, La Guaira (Lutz, 1927); Puerto Cabello (Günther, 1858; Boulenger, 1882); Venezuela (Günther, 1858; Boulenger, 1882; Nieden, 1923).

Range. The Coastal Range and Falcón Region. Reported from Colombia by Peracca, 1914 (Cafetal Camelia, nr. Angelópolis, 1820 m.), Werner, 1916 (Cañón de Tolima), and Boulenger, 1882 (Bogotá). These records probably refer to *B. typhonius alatus.* Dunn (1944) does not mention this species in his ''Herpetology of the Bogotá Area'' but he includes *Bufo typhonius* in the actual fauna of Bogotá.

Remarks. This species is very close to *Bufo typhonius alatus* with which it has been often confused and with which it perhaps interbreeds (though not freely) in part or all of its range. Generally it is well characterized (U.M.M.Z.) but specimens are found (M.C.Z. and U.C.V.) that are very similar to *B. typhonius,* especially in coloration and general appearance. In all these cases the palm and fingers are spinulous (not a sexual character) and the metatarsal fringe absent. The supraorbital ridge is also more prominent in *B. typhonius* and presents a pleated appearance in the region where a parietal ridge would join the supraorbital. The upper eyelid thus appears to be lower on the sides in *B. typhonius* than in *B. sternosignatus.* If a perpendicular line were to be drawn from the upper edge of the supraorbital ridge to the outside, the upper eyelid would be mostly above the line in *sternosignatus* and below it in *typhonius.*

BUFO TYPHONIUS TYPHONIUS (Linné)

Rana typhonia Linné, 1758, Syst. Nat., ed. 10: 211: America.
Bufo typhonius Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.
Bufo typhonius typhonius Leavitt, 1933, Copeia: 8.

7 (U.P.R. 4-10) Slopes Mt. Marahuaca, 4000 ft., v.50.
7 (U.P.R. 1-3, 11-12, 14-15) Upper Cunucunuma R., v-vii.50.
1 (U.P.R. 13) Anabén, Colombia, vi.50.
1 (U.S.N.M. 83949) Yapacana, iv.21.

Description. Snout prominent, with a more or less distinct vertical ridge at the tip, from the level of the nostrils to the edge of the jaw; tongue narrow, entire; eye diameter slightly greater than distance between eye and nostril; interorbital space twice as broad or broader than an upper eyelid; canthus well defined, curved; loreal almost vertical and a little concave; tympanum moderate, oval, ⅔ the eye diameter; preorbital and descending ramus of the postorbital ridge slight or absent; supraorbital ridge strong, anteriorly merging with the canthal, posteriorly with the very prominent supratympanic crest; parietal ridge distinct, forming a basin with the parotid; parotids prominent but small and superficial; edge of the upper jaw studded with minute acuminate tubercles; two knob-like protuberances at the angle of the jaws; first finger not extending beyond second; tips of the fingers and toes swollen, their sides serrated; tarsal fold absent; subarticular tubercles large, usually single or fused; a row of closely set, small spinules along the outer edge of the metatarsal segment and fifth toe; toes partially webbed, the web reaching at least to the penultimate phalanx in all the toes except the third, where it does not extend beyond the proximal phalanx; heel of the adpressed hind limb extends to between parotid and tympanum. Skin above and on the sides of the head tubercular; tubercles spiny on the flanks and limbs; a fringe of pointed tubercles from anterior border of parotid to groin; ventral surfaces granular, some of the granules spiny on the pectoral region.

Color. Above, brown, uniform or with irregular lighter and darker markings; from tip of snout to end of urostyle a yellowish vertebral stripe of varying width, on either side of which, especially in the sacral region, roundish black spots may be present or absent; flanks below the lateral fringe, occasionally lighter or darker than the dorsum. Below, yellowish brown, plain, infuscate or spotted; limbs with broad, more or less distinct crossbars.

Measurements. Snout-vent ♂ 42, ♀ 61; head breadth ♂ 14, ♀ 21; head length ♂ 14, ♀ 18; femur ♂ 17, ♀ 25; tibia ♂ 17, ♀ 24.

Habits. In life this amphibian closely resembles a dead leaf, its serrated sides and coloration contributing to make the similarity more striking. Relying on its ability to escape detection the toad usually remains motionless on the approach of danger, though sometimes taking several hops before merging again with the leaves carpeting the forest floor.

The call of this species is probably a low-toned guttural sound, similar in some respects to that of *Bufo marinus* but much shorter and lower. This noise was traced to specimens of *Bufo typhonius* on several occasions but in no instance was the animal actually seen calling.

Of 6 stomachs examined all contained ants, each of 3 held a curculionid beetle, one an isopteran, two a piece of leaf, and one a seed (probably ingested with the ants). An engorged specimen contained 30 ants, 1 mm. in length, and 2 wingless wasps, each 2 mm. long, besides other unidentifiable insect remains.

Additional Localities. Upper Orinoco (Boettger, 1896).

Range. The southern part of the Venezuelan Guayana. According to Leavitt the subspecies "extends from Venezuela, south and east through the Guianas and well south through Brasil."

BUFO TYPHONIUS ALATUS Thominot

Bufo alatus Thominot, 1884, Bull. Soc. Philom. Paris, *8*: 151: Obispo, Isthmus of Panama.

Bufo typhonius alatus Leavitt, 1933, Copeia: 8.

2 (U.M.M.Z. 55571-2) Bejuma.
1 (U.M.M.Z. 55573) Estación Ferrocarril, Táchira.
2 (U.M.M.Z. 55574-5, juv.) La Fría.
1 (U.M.M.Z. 85124) W. of Wiaka Piapu Mt.
1 (U.M.M.Z. 85125) Wiaka Piapu Mt.

Description. *Bufo typhonius alatus* differs from the typical form in lacking the bony protuberance at the angle of the jaws and in having a longer hind limb, the heel of the adpressed hind limb extending to the tympanum or slightly beyond. The parotid is usually narrower and pointed posteriorly.

Measurements. ♂, snout-vent 50.5; head length 15; head breadth 18; femur 23; tibia 21.

Habits. Apparently a forest animal.

Range. The Coastal Range and the northwestern slopes of the Occidental Andes, southeastern Venezuela. According to Leavitt: "as much of Central America as it inhabits and extends south and east into Venezuela and south and west into Colombia." British Guiana.

Remarks. I have been unable to confirm all the characters mentioned by Leavitt, but the absence of jaw knob and the shorter hind limbs are perhaps sufficient for racial recognition of this form. On the other hand, the distribution of the two races is quite problematic and occasional specimens of *Bufo typhonius* from the Coastal Range have well developed bony protuberances at the jaws. The Colombian frogs examined lack the jaw knobs but a trace of these is found in Panamanian examples.

Bufo typhonius alatus occurs in southeastern Venezuela and in the western part of British Guiana (U.M.M.Z. 63045, Tukeit Hill, Potaro R.) and with little doubt it will be found in the Delta Region. Specimens with all the characters of *Bufo typhonius typhonius* have been collected as far north as Dunoon (M.C.Z. 6073, about 45 km. south of Georgetown, on the margin of the Demerara R.). It is thus possible that this form passes north through the valley of the Demerara or that it moves westward along the forested north coast of South America from the eastern Guiana. If the two animals are really races of each other, it appears that the zone of intergradation is longitudinal, more or less along the Essequibo River.

LEPTODACTYLIDAE

Key to the Genera of Venezuelan Leptodactylidae

- I. Sternum cartilaginous.
  - A. Tympanum absent.
    - 1. No vomerine teeth; a tubercle on the forearm and another on the tarsus .... *Pseudopaludicola*
  - B. Tympanum present.
    - 1. Toes with disks, without web; vomerine teeth behind the choanae[1] .... *Eleutherodactylus*
    - 2. Toes without disks, with web .... *Ceratophrys*
- II. Sternum with a bony style.
  - A. Upper jaw without teeth; a small parotid gland .... *Eupemphix*
  - B. Upper jaw with teeth; no parotid gland.
    - 1. A large inguinal gland .... *Pleurodema*
    - 2. No inguinal gland.
      - a. Terminal phalanges T-shaped .... *Lithodytes*
      - b. Terminal phalanges simple .... *Leptodactylus*

Key to the Species of LEPTODACTYLUS *Reported from Venezuela*

- I. Tips of the toes dilated into small, but distinct disks; first finger not extending beyond second; 22 mm. .... *marmoratus hylaedactylus*
- II. Tips of the toes not dilated into disks; first finger longer than second.
  - A. Two or more dorsal folds.
    - 1. Dorsal folds not more than two.
      - a. Dorsal folds not extending posteriorly beyond sacrum; lateral fringes of toes slight; thighs marbled with reddish; breeding male with two breast and one thumb spine but no apparent external vocal sac; 150 mm. .... *p. pentadactylus*
      - b. Dorsal folds extending to inguinal region.
        - 1. Lateral fringes of toes very distinct (lateral flaps); no white longitudinal line on the posterior part of the thighs.
          - a. Heels do not overlap when brought together in the anal region (tibia and femur more or less equal); anterior convexities of vomerine teeth not extending to choanae; 70 mm. .... *rhodomystax*
          - b. Heels overlap considerably when brought together in the anal region (tibia longer than femur); anterior convexities of vomerine teeth reaching the choanae and generally extending beyond their posterior margin; 73 mm. .... *bolivianus*
        - 2. Lateral fringes of toes absent or faintly indicated; a white, longitudinal line along the posterior part of the thighs.

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[1] *Eleutherodactylus conspicillatus* occasionally shows a trace of web in Ecuador. Some Antillean *Eleutherodactylus* also possess webs.

a. An uninterrupted, white streak along the margin of the upper jaw to the shoulder; dorsal folds dark on the anterior end; 47 mm. . . . . *mystaceus*

b. Two or more bars from lower eyelid to upper lip; dorsal folds usually light colored throughout, 45 mm. . . . . *poecilochilus dypticus*

2. Dorsal folds more than two;[1] spotted above.

a. Snout acuminate, well projecting beyond the mouth; lateral fringes of toes absent or slight; a longitudinal white line or close series of dots along the posterior part of the thighs; male with no breast or thumb spines but two black external vocal sacs; 40 mm. . . . . *sibilatrix*

b. Snout subelliptical, not extending much beyond the mouth; lateral fringes of toes distinct; no white longitudinal line along the posterior part of the thighs; a series of white dots along the margin of the lower jaw; male with two large thumb spines; 70 mm. *ocellatus*

B. No dorsal folds.[2]

1. Toes with very distinct lateral fringes; male with two thumb spines but no breast spines; color not black; 37 mm. . . . . *podicipinus petersii*

2. Toes without lateral fringes; male with breast spines and one thumb spine; dorsum very rugose; color usually black; 60 mm. . . . . *rugosus*

LEPTODACTYLUS MARMORATUS HYLAEDACTYLUS (Cope)

Cystignathus hylaedactylus Cope, 1868, Proc. Acad. Nat. Sci. Phila.: 115: Napo and Marañón rivers.

Leptodactylus discodactylus Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

1 (U.P.R. 102) Anabén, Colombia, vi. 50.
1 (U.P.R. 103) Marahuaca, 4,050 ft., v.50.
1 (U.P.R. 228) La Culebra, 1,000 ft., vi.50.

Description. Snout subelliptical, projecting slightly beyond the mouth; tongue narrow, oval, indistinctly nicked behind; vomerine odontoids in two short oblique series behind the choanae, their posterior extremities directed inwards; eye diameter slightly greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus absent; loreal moderately inclined, concave; tympanum about ¾ the eye diameter; a slight supratympanic fold to the shoulder and a small, glandular ridge from shoulder to the angle of the mouth; first finger not extending beyond second, which is more or less equal to fourth; subarticular tubercles of fingers and toes very large and prominent; fingers distally swollen; toes dilated into small disks; tarsal and metatarsal folds present but indistinct; toes almost free, without lateral fringes; heel of the adpressed hind limb extends to the tympanum. Skin above, with numerous tubercles and short longitudinal folds, especially on the posterior half; a loose lateral fold from supratympanic fold to the inguinal region. Below, smooth, with a discoidal, ventral fold. Breeding male with a slight anterior ridge on the snout and a pair of longitudinal external vocal sacs that extend to the base of the humerus.

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[1] Specimens in which some of the folds are not easily seen are found. See "Remarks" under *L. bolivianus*.

[2] *L. podicipinus petersii* may occasionally show very slight folds on the anterior part of the back.

Color. Above, grayish or light brown, spotted with darker brown or black; usually a triangular spot between the eyes; limbs crossbarred. Below, uniformly white or infuscated on the throat and breast.

Measurements. ♂ snout-vent 22.5; head breadth 8; head length 8; femur 9; tibia 11.

Habits. All specimens were collected on the forest floor.

Additional Localities. Caripito (U.S.N.M. ♀ 2); Minapana (U.M.M.Z. 55550); Boettger's, 1896, *L. discodactylus* from the Upper Orinoco (Tiriquín and Guayamaco) was found to represent this species.

Range. The Coastal Range, the Delta Region and the Venezuelan Guayana. Southeastern Colombia, British Guiana, Surinam and south to the Napo and Marañón rivers.

Remarks. A specimen from Surinam in the M.C.Z. is of a lighter ground color and the dorsolateral spots are better defined than in the Venezuelan specimens. The frog from Marahuaca is darker than the other two animals and in this respect it is closer to a specimen from Oyapock River, Brasil. In the two frogs from Caripito in the U.S.N.M., the vomerine teeth are almost transverse, the tongue not nicked and there is no metatarsal fold. U.M.M.Z. 55550 also has transverse vomerine teeth. This specimen is a little desiccated.

This form is very similar to *L. marmoratus* (*L. dyptix*, auct.) from which it is distinguished by the presence of small disks. I have considered the two forms conspecific as one seems to represent the other in the northern part of the continent (as already noticed by Cochran, 1955: 309) and some specimens from Bolivia show an intermediate condition in disk development (M.C.Z.

15583 and others). The only obstacle to this conclusion is Melin's *L. rugosus* from Manaos, Brasil, which is considered similar to these forms and according to the author, does not have disks. He had only one specimen and it is possible that occasional specimens without disks may be found in the north. I rather suspect that this animal had small disks.[1]

The situation suggested would result in *L. marmoratus* Parker, 1835, *L. melini*, Lutz and Kloss, 1952, and probably *L. andreae* Miller, 1923, being referred to the synonymy of *L. marmoratus hylaedactylus.*

It is possible that Steindachner's (1867) figure of *Adenomera marmorata* refers to the northern form since slight swellings that could be disks are shown on the toes, and the type locality (of the figured animal) is unknown.[2] If this is the case, then the northern form should be called *L. marmoratus marmoratus* and the southern *L. m. dyptyx*. For the present it seems best to follow Parker (1932) and apply the name *L. m. marmoratus* to the southern animal.

LEPTODACTYLUS PENTADACTYLUS PENTADACTYLUS (Laurenti)

Rana pentadactyla Laurenti, 1768, Syn. Rept.: 32: Indiis, i. e. Surinam (restricted by L. Müller, 1927).

Leptodactylus pentadactylus Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

5 (U.P.R. 78-82) Casurua, iv.50.
1 (U.P.R. 83) Anabén, Colombia, vi.50.

Description. Head considerably broader than long; snout subovoid; tongue widely oval, emarginate behind; vomerine odontoids in two arched series, with their anterior convexities between the choanae; eye diameter more or less equal to distance between eye and nostril; interorbital space narrower than an upper eyelid; canthus obtusely angular; loreal sloping, concave; tympanum large, obliquely oval, ⅔ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder; first finger longer than second; tarsal fold strong; soles smooth; subarticular tubercles of toes conical; web absent or slight; lateral fringes of toes faintly indicated; heel of the adpressed hind limb extends to the tympanum. Skin above, finely granular; a pair of dorsolateral folds from upper eyelids to sacral region and sometimes two other loose lateral folds from supratympanic fold to groin; sides of the head granular. Belly and throat smooth; an indistinct ventral discoidal fold. Breeding male with a bicuspid or tricuspid tubercle on each side of the breast; arms swollen; a strong spine-bearing tubercle on the inner side of the first digit and numerous small spinules on each side of the throat, breast and lower parts of the humerus; no apparent external vocal sac.

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[1] After this statement was written Lutz and Kloss (1952) collected in the same general region and found a small *Leptodactylus* with disks in the toes which they regard as Melin's form.

[2] There is, apparently, no statement of the type locality in the jar of the specimen figured, for Parker, 1932, does not mention it.

Color. Above, yellowish brown or chestnut, with darker, black margined, transverse bars: a black streak along the canthus rostralis and supratympanic fold; upper lip with dark triangular spots; limbs crossbarred; a usually interrupted black line along the hind part of the forelimb; posterior part of the thighs black and salmon or pinkish yellow marbled; groin and flanks generally tinged with salmon. Belly and throat white, immaculate or marbled with brown; lower jaw dark and white barred; throat infuscate; a black ventral spot at the base of the arm.

Measurements. Snout-vent ♂ 146, ♀ 160; head breadth ♂ 57, ♀ 60; head length ♂ 49, ♀ 51; femur ♂ 54, ♀ 51; tibia ♂ 64, ♀ 65.

Habits. This species occurs commonly along the Cunucunuma River where the Maquiritare Indians use it as food. Its voice was often heard at night but all our specimens were brought by Indians, who apparently objected to one of their greatest delicacies being thrown into a jar of formalin, preferring to bring a few themselves rather than permitting the collection of too many. A large foam nest attributed to this species by the Indians was found in a small depression between the roots of a tree. There were neither eggs nor tadpoles present and the nearest water was that of the river about 200 yards away.

Of several stomachs examined, two were empty, one had the remains of a small frog, many large pieces of leaves and a few legs and other insect remains; another contained a huge scorpion, by whose sting the predator was apparently unaffected (it was puncturing the stomach wall) and several sticks, leaves and other unidentifiable remains.

Additional Localities. 1½ hr. above Paso del Diablo (A.M.N.H. 23164).

Range. The Venezuelan Guayana. The species extends from Central America and Trinidad to Perú and southern Brasil. The race goes as far south as Ceara.

Remarks. It would be interesting to discover how this species reached Central America as it has not yet been discovered in northern Venezuela nor in the Llanos. There is a specimen from the Andes of Bogotá (not examined) in the collection of the American Museum.

LEPTODACTYLUS RHODOMYSTAX Boulenger

Leptodactylus rhodomystax Boulenger, 1883, Proc. Zool. Soc. London: 637, pl. lviii, fig. 2: Yurimagas, Huallaga River, Northern Perú.

1 (A.M.N.H. 23175) Esmeralda, 28.

Description. Head a little broader than long; snout subovoid to rounded; tongue with a slight notch behind; vomerine odontoids in two very slightly arched series behind the choanae; eye diameter equal to distance between eye and nostril; interorbital space more or less of the same breadth as an upper eyelid; tympanum distinct, ¾ the eye diameter; canthus flat, indistinct; loreal sloping, slightly concave; a thick supratympanic fold from lower eyelid to shoulder; an elongated glandule at the angle of the mouth; first finger longer than second but much shorter than third; subarticular tubercles moderate; a strong tarsal fold and a very pronounced flap from outer metatarsal tubercle to tip of the last toe; other toes similarly fringed and with a short web (2, 2, 3, 4, 4); inner metatarsal tubercle more protuberant and elongated than the outer; heel of the adpressed hind limb extends to middle of the eye. Skin above somewhat rugose, with two glandular folds from posterior corner of the eye to inguinal region; flanks with several rounded glandules. Below, smooth.

Color. Above, vinaceous-brown, the dorsolateral folds and some of the lateral glandules of a blackish or dark gray color; upper lip light, vermiculated or spotted with darker; apparently a canthal and a supratympanic streak; anterior and posterior aspect of the thighs marbled with brown and black, the rest of the limbs with obscure dark spots. Below, yellowish-white; lower lip grayish, dotted with white; probably there were white spots on the throat and pectoral region; distal portion of the hind limbs speckled with dark.

Measurements. ♀ snout-vent 70; head breadth 24; head length 25.5; femur 33; tibia 34.5.

Range. The Venezuelan Guayana. The species is said to occur in British Guiana, Colombia, Brasil and Perú.

Remarks. I have decided to follow rather uncritically Dr. Dunn's determination of this specimen until topotypical material is available for comparative purposes. From a glance I took at specimens of *L. stictigularis* Noble (= *L. rhodomystax*, fide Parker, 1935) from British Guiana and at a specimen from Río Uaupés determined as *L. rhodomystax* in A.M.N.H. (39791), I got the impression that this animal is none of them and that if the latter is the real *rhodomystax* then *stictigularis* is not an absolute synonym. The Río Uaupés form seems to me identical with the animal pictured and described by Lutz (1926: 149, pl. xxxii) and I do not think it represents *L. mystaceus* as thought by Parker (*op. cit.*). At least it is much larger than any *mystaceus* I have seen and the color has a reddish tinge not found in that species. The animal here described has very strongly developed lateral fringes on the toes, the second finger is only a little shorter than, and the third much longer than, the first. I noted that the first finger of *L. stictigularis* is about as long as the third and the second is only ⅔ the first. The lateral fringes are present but not even half as prominent as in the Venezuelan animal.

LEPTODACTYLUS BOLIVIANUS Boulenger

Leptodactylus bolivianus Boulenger, 1898, Ann. Mus. Civ. Stor. Nat. Genova, *19*: 131: Barranca and Misiones Mosetenes, Bolivia; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45, pl. x, figs. 10, 11; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 535; Alemán, 1952, Mem. Soc. Cienc. Nat. LaSalle, *12*: 26.

Leptodactylus ocellatus Stejneger (not Linné), 1902, Proc. U. S. Nat. Mus., *24*: 180.

2 (U.P.R. 84, 86) Anabén, Colombia, vi.50.
1 (U.P.R. 85) Sn. Fdo. de Atabapo, vi.50.
2 (U.P.R. 87-8) La Culebra, 1000 ft. iv.50.
4 (M.C.Z. 25985-8) Paují, iv-xi.45.
1 (M.C.Z. 26143) Riecito, 29.

Description. Head usually longer than broad; snout subelliptical; tongue broad, oval, emarginate behind; vomerine odontoids in two arched series behind the choanae, their anterior convexities extending sometimes to the middle of the inner margin of the latter; eye diameter shorter than, or equal to, distance between eye and nostril; interorbital space equal to an upper eyelid; canthus rounded but distinct; loreal somewhat sloping, concave; tympanum large, circular, distinct, ¾ the eye diameter; first finger longer than second; subarticular tubercles of fingers large, rounded, of toes, oval or conical; soles mostly smooth; toes very slightly webbed, the web extending to the tips as conspicuous lateral fringes; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with two dorsolateral folds from upper eyelid to groin; a supratympanic fold from posterior corner of the eye to shoulder; also occasionally present is a slight pair of lateral folds; an elongated glandular fold at the angle of the mouth. Below, smooth, with a discoidal fold on the belly. Arms in the breeding male swollen and bearing one or two tubercles on the inner side of the first digit.

Color. Above, dark or light gray, generally marked with dark blotches on the posterior half; a black canthal streak which continues behind the eye as a temporal spot to the shoulder; a few black blotches sometimes follow this spot on the anterior part of the flanks; dorsal folds usually black-edged; between them a dark, central marking broadens in front to form an anteriorly truncate spot between the eyes; tympanum chestnut; upper lip light, sometimes with dark, vertical spots; posterior part of the flanks near the inguinal region with black blotches and smaller white spots; posterior aspect of the thighs marbled; rest of the hind limb crossbarred, the bars being black and very distinct on the hidden portions of the tibiae. Below, uniformly grayish white or slightly marbled with gray; lower lip with round, white dots.

Measurements. Snout-vent ♂ 72, ♀ 73; head breadth ♂ 24.5, ♀ 24; head length ♂ 25, ♀ 25.3; femur ♂ 31, ♀ 31; tibia ♂ 39, ♀ 41.

Habits. Some of the specimens were collected in a partially inundated, largely treeless area near the river; others were found in a trail passing through very tall grass about 50 feet from the river edge and 25 from the forest.

Of three stomachs examined, one contained a pentatomid bug, a spider and a small beetle. The second had one complete beetle and other beetle remains, while the third was empty.

Robinson (in Stejneger, 1902) describes the breeding habits of this frog: "This frog makes a noise like the sound of water gurgling from a bottle, only it is a single note and louder. They make in the weeds in the water's edge a bird's nest of bubbles or more like the whipped-up white of eggs and even more gelatinous. The depression in the center goes entirely through and the frog sits in the water below, with its nose and eyes appearing in the bottom of the nest."

Additional Localities. Baruta (Alemán, 1952); Caracas (Lutz, 1927); nr. Carapa (U.S.N.M. 80613-4); Casiquiare, 8 mi. below Orinoco (A.M.N.H. 23167); Cocollar (Schmidt, 1932); Encontrados (C.N.H.M. 2603); Higuerote (U.C.V. 51); La Fría (U.M.M.Z. 55582); La Guaira (U.S.N.M. 22539, 27793 [= Stejneger, 1902]); La Trinidad (C.N.H.M. 28114, 35988-9); Maracay (Lutz, 1927); Palma Sola (U.M.M.Z. 55581); Parmana (U.C.V. 66); Río Sn. Esteban (U.M.M.Z. 55580); Sosa (U.C.V. 80); Sucre (C.N.H.M. 17769-71 [= Schmidt, 1932?]); Turgua (Alemán, 1952); Turmero (C.N.H.M. 2734).

Range. Probably found in all the physiographical provinces of Venezuela. Central America to Perú, Bolivia and Brasil.

Remarks. Specimens from north of the Andean System seem to have a lighter ground color, more blotches on the posterior part of the body and flanks and more numerous and distinct crossbars on the limbs. In the two Culebra specimens the dorsum is somewhat rugose and with small scattered tubercles and the ventral surfaces are lightly marbled. No appreciable difference has been found between animals from southern Venezuela and a topotypical specimen.

Boulenger describes the male of the species as having a single tubercle on the inner finger, apparently a sign of immaturity, for sexually mature specimens have two tubercles.

This species is allied to *Leptodactylus ocellatus* from which it can be distinguished by its coloration, by having not more than two dorsal folds, and by the lesser development of the forelimbs in the breeding male. An occasional specimen is found in which these characters do not work. The greater breadth of the interorbital space in *L. bolivianus* may be useful in these doubtful cases.

A specimen from Colombia deposited at the Museum of Vertebrate Zoology does not seem to have any dorsal folds.

LEPTODACTYLUS MYSTACEUS (Spix)

Rana mystacea Spix, 1824, Spec. Nov. Test. Ran.: 27, pl. iii, fig. 1, 3: Bahía.
?*Leptodactylus poecilochilus* Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

1 (U.P.R. 91) Anabén, Colombia, vi.50.
2 (U.P.R. 37-38) Marahuaca, v.50.

Description. Head broad at the base; snout subovoid, extending well beyond the mouth; tongue oval, emarginate behind; vomerine odontoids in two slightly arched series behind the choanae, fairly close together and extending outwards to about the middle of the posterior margin of the latter; eyes dorsally depressed, their diameter equal to distance between eye and nostril; interorbital space somewhat broader than an upper eyelid; canthus not very distinct; loreal oblique, concave; tympanum distinct, ¾ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder; an elongated gland at the angle of the mouth; first finger longer than second; tarsal fold slight, metatarsal absent or faintly indicated; soles slightly tubercular; subarticular tubercles of toes and fingers large, prominent; toes free or with a rudimentary web; lateral fringes of toes faintly indicated; heel of the adpressed hind limb extends to the eye. Skin above and on the flanks and limbs shagreened; a pair of dorsolateral folds from upper eyelid to groin. Belly and throat smooth; thighs granular; a ventral discoidal fold. Breeding male with a sharp anterior ridge in front of the snout and two external vocal sacs indicated by a pair of shallow pigmented grooves at the sides of the throat.

Color. Above, brown, with the dorsal folds of a black or dark color on the cephalic and light on the caudal extremities; a well defined black canthal, and supratympanic streaks; upper lips margined with dark; a white "mustache" above the dark line of the upper lip extends posteriorly to the shoulder; tympanum chestnut; a dark saddle-shaped marking between the eyes; a broad, dark brown line along the posterior surface of the forelimbs and a white, slanting one on the anterior side of the humerus; thighs with a dark streak or series of spots along their anterior border and a white, dark-edged longitudinal line along their hinder aspect; hind limbs with broad crossbars; hidden portions of the tibiae with well-defined black spots. Below, white; the throat, chest and limbs sometimes speckled with brown.

Measurements. Snout-vent ♂ 47, ♀ 48.5; head breadth ♂ 17, ♀ 17.3; head length ♂ 17, ♀ 17; femur ♂ 21, ♀ 22; tibia ♂ 24, ♀ 25.5.

Habits. Of two stomachs examined, one was empty and the other contained a cricket and a seed.

The female specimen in the collection is full of very large, yellow eggs.

Additional Localities. Boettger's, 1896, *L. poecilochilus* from Upper Orinoco may refer to this species.

Range. The Venezuelan Guayana. Southeastern Colombia and British Guiana to southern Brasil.

Remarks. Specimens from Río Humboldt, Brasil and Buenavista, Bolivia, do not show any appreciable difference from the Venezuelan animals.

The species is related to *L. poecilochilus* from which it can be distinguished by the different coloration of the snout and its tubercular soles. The white coloration of the loreal area is more extensive dorsally in *L. poecilochilus* and not narrow and well defined as in *L. mystaceus.* This "mustache" is not interrupted by spots or lines in *L. mystaceus.*

LEPTODACTYLUS POECILOCHILUS DYPTICUS Boulenger

Leptodactylus dypticus Boulenger, 1918, Ann. Mag. Nat. Hist., (9) *2*: 431: Andes of Venezuela; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45, pl. x, figs. 12, 13; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 535.

2 (M.C.Z. 25989-90) Paují, iv, xi.44.
1 (U.M.M.Z. 55554) Palma Sola.
1 (U.M.M.Z. 57483) Sabana de Mendoza.
1 (U.M.M.Z. 57484) Guachi.

Description. Head broad at the base; snout subovoid, longer than the eye diameter; tongue oval, emarginate behind; vomerine odontoids in two long, slightly arched and close-together series behind the choanae, their anterior convexities not extending beyond the horizontal of the posterior margin of the latter; eye diameter equal or slightly greater than distance between eye and nostril; interorbital space equal to or narrower than an upper eyelid; canthus indistinct; loreal sloping, slightly concave; tympanum distinct, ⅔ the eye diameter; a supratympanic fold from lower eyelid to shoulder; an elongated glandule at the angle of the mouth; first finger much longer than second; fingers and toes distally swollen; tarsal fold not distinct, metatarsal slightly indicated; inner metatarsal tubercle small, subarticular tubercles large and very prominent; soles usually smooth or nearly so; toes free, without lateral fringes; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth, with two dorsolateral folds that extend from upper eyelid to groin; another pair of loose folds along each side of the body; flanks with small, scattered warts. Below, smooth, with a discoidal fold on the belly.

Color. Above, gray or light brown, with a pair of dark, elongated spots behind the scapulae, at the edge of the dorsolateral folds; a distinct, black canthal streak that does not extend to the eye; a black supratympanic streak; a black, broad, anterior and a narrow posterior line from eye to dark-margined upper lip; tympanum chestnut; interorbital space with a narrow transverse line; dorsolateral folds light colored; forelimbs crossbarred; thighs with a broad dark streak or series of large spots along the anterior border, their posterior aspect with a white, dark-edged, longitudinal line; sometimes the thighs are closely crossbarred above; hidden portions of the tibiae with very distinct black bars. Below, milky white; lower lip edged with a dark grayish line which disappears anteriorly.

Measurements. ♀ Snout-vent 45; head breadth 16; head length 16; femur 12; tibia 14.

Additional Localities. Maracay (Lutz, 1927).

Range. The Coastal Range, the Falcón Region, the Maracaibo Basin and the lower slopes of the Western Andes. Northeastern Colombia.

Remarks. The number of specimens available have been insufficient to determine whether the Venezuelan form is really identical with the Colombian-Central American *poecilochilus.* They clearly show, however, that the two are very closely related and probably conspecific.

Four of the five Costa Rican frogs examined are of the "*quatrilineatus*" type which is said to be the least common within the range of *L. p. poecilochilus* (Dunn, 1940: 106). M.C.Z. 7997 from the same locality and collection as the "*quatrilineatus*" group is mostly plain above and similar in many respects to M.C.Z. 16069 from Río Frío, Colombia and to the Venezuelan animals, for which the striped coloration has never been reported. Apart from this, little is left to separate the two forms. It appears that *L. p. poecilochilus* is more spotted on the dorsum, has better defined spots between upper lip and eye and a broader white line along the posterior aspect of the thighs. The canthal streak seems to extend to the eye in most *poecilochilus* while in *dypticus* it stops before reaching the orbit. It would be necessary to have more non-"*quatrilineatus*" specimens to determine if these differences really exist and if there are any others.

M.C.Z. 25989 has a rosy tinge on the flanks and thighs and both 25989 and 25990 are of a light gray color, differing in this respect from the U.M.M.Z. specimens, in which the color is brown. This may be due to differences in the preservatives used. In 25990 the transverse bars of the thighs are narrow and numerous while in the other specimens they are indistinct or absent.

The male *L. p. dypticus* from Río Frío, Colombia (37.5 mm.) has a very pronounced ridge in front of the snout. U.M.M.Z.

57484 looks somewhat different on account of its unusually narrow head but it agrees in other characters.

In the files of the American Museum of Natural History I noticed that there are one or more specimens from Medellín, Colombia, determined as *L. dypticus,* but probably representing the typical form. I believe the Argentinian specimens mentioned by Dunn (*op. cit.*) refer to some other species, perhaps *L. mystaceus.*

LEPTODACTYLUS SIBILATRIX (Wied)

Rana sibilatrix Wied, 1824, Abbild. Naturg. Bras., No. 4: 5, pl. 5, fig. 2: East Coast of Brazil.

Cystignathus typhonius Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 39.

Leptodactylus mystacinus Boettger (part: not Burmeister), 1892, Kat. Batr. Samm. Mus. Senckenb.: 30; Nieden (part?), 1923, Das Tierreich. Anura I: 485; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45.

Leptodactylus typhonius Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 31; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Lutz, A., Mem. Inst. Osw. Cruz, *20*: 39, 46.

9 (U.P.R. 92-100) Pto. Ayacucho, iii, vi.50.

Description. Head longer than broad; snout acuminate, projecting well beyond the mouth; tongue oval, emarginate behind; vomerine odontoids in two slightly arched series close together behind the choanae; eye diameter equal or slightly greater than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus absent; loreal sloping, slightly concave; tympanum distinct, ⅔ the eye diameter; a slight supratympanic fold from lower eyelid to shoulder; an elongated gland at the angle of the mouth; first finger longer than second; tarsal fold usually slight; metatarsal fold may be faintly indicated; soles with minute, flat granules; toes free, their lateral fringes absent or faintly indicated in very dry specimens; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with several (usually more than 5) dorsal, longitudinal folds. Below, smooth, with a distinct discoidal fold on the belly. Male with two lateral external vocal sacs; arms not enlarged; inner side of the first digit without tubercles.

Color. Above, brown or tan, spotted with darker brown markings; one or two spots generally present between the eyes; tympanum chestnut, with a white rim; limbs crossbarred; posterior surface of the thighs marbled, but with a well defined, longitudinal, white line or continuous series of dots along its lower part. Belly milky white; vocal sacs pigmented with dark gray or black.

Measurements. Snout-vent ♂ 42.5, ♀ 39.5; head breadth ♂ 14, ♀ 13.1; head length ♂ 15, ♀ 15; femur ♂ 18.2, ♀ 18.5; tibia ♂ 24, ♀ 22.

Habits. Several specimens were collected at night, after heavy rain, in the shallow pools of a grassy (2 or 3 inches grass) area. Others were collected in tall grass while calling at night. The voice is probably a short ''huit'' sound, as described by Lutz for *L. mystaceus.*

Additional Localities. Arabopó (U.M.M.Z. 39757, 85201[5], 85205); Caracas (Senckenb. Mus. 1244b [= Boettger, 1892: 39, part]); Chícare (Caicara?) (U.S.N.M. 36369-70): Espino (U.C.V. 69); 10 km. from La Pascua (U.S.N.M. 128839); Maracay (Lutz, 1927); Pie del Cerro (U.S.N.M. 121148); Roraima (A.M.N.H. 39752); Sabana de Mendoza (U.M.M.Z. 75478); Sta. Elena, Bolívar (U.M.N.Z. 85204); Sosa (U.C.V. 86); Upper Orinoco (Boettger, 1896); Wiaka Piapu, 5000 ft. (U.M.M.Z. 85200[2]).

Range. The Maracaibo Basin, the Coastal Range, the Llanos and the Venezuelan Guayana. Northern Colombia to northern Argentina.

Remarks. Specimens from Sabana de Mendoza are of a much darker ground color; the spots are rather obscure and the dorsal folds are absent or reduced to two slight ones. Animals from Sta. Marta, Colombia, are not very different from those of the rest of Venezuela, but a lot from Magdalena Valley, Colombia, have a somewhat rugose skin and as dark a color as the specimens from Sabana de Mendoza. These last animals probably represent a subspecies.

L. sibilatrix can be confused with young *L. ocellatus*, from which it can be distinguished by its more projecting and acuminate snout, by the absence of white dots on the lower lip and of lateral fringes on the toes and by the presence of a longitudinal white line on the posterior part of the thighs. The breeding male of *L. ocellatus* has enlarged forearms and two tubercles on the inner side of the first digit but no apparent external vocal sacs.

LEPTODACTYLUS OCELLATUS (Linné)

Rana ocellata Linné, 1758, Syst. Nat., ed. 10: 211: America.

Cystignathus ocellatus Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 39.

Leptodactylus ocellatus Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 45.

2 (U.M.M.Z. 83718) Sn. Fdo. de Apure.
1 (U.M.M.Z. 89583) Río Amana, nr. Maturín.
1 (U.C.V. 11) Parmana, vi.51.
4 (U.C.V. 31-33, 35) El Sombrero, viii.51.

Description. Head longer than broad; snout subelliptical; tongue broad, oval, emarginate behind; vomerine odontoids in two arched series behind the choanae, their anterior convexities extending sometimes to the middle of the inner margin of the latter; eye diameter equal to distance between eye and nostril; interorbital space narrower than an upper eyelid; canthus absent; loreal somewhat sloping, concave; tympanum distinct, 3/4 the eye diameter; a supratympanic fold from posterior corner of eye to shoulder and a thick glandular ridge from this to the angle of the mouth; first finger longer than second; tarsal fold strong, metatarsal indistinct or absent; soles mostly smooth; subarticular tubercles of fingers large and rounded, of toes, conical; toes slightly webbed, the web extending to the tips as conspicuous lateral fringes; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with several (usually more than 5) longitudinal folds; flanks sometimes with small, rounded glandules. Below, smooth, with a discoidal fold on the belly. Arms in the breeding male much swollen and bearing two blunt tubercles on the inner side of the first digit.

Color. Above, light brown spotted with a darker shade of brown; occasionally some of the spots are elongate and follow the dorsal plicae for part of their length; a usually symmetrical spot between the eyes; a canthal and a temporal streak; thighs marbled behind; hind limbs crossbarred. Belly and throat white, uniform, mottled or dusted with brown; a series of white dots along the margin of the brown pigmented lower jaw. Throat may have white spots on a brownish background.

Measurements. Snout-vent ♂ 71.5, ♀ 60; head breadth ♂ 25.5, ♀ 21; head length ♂ 24, ♀ 22; femur ♂ 31, ♀ 25; tibia ♂ 34, ♀ 28.5.

Additional Localities. Puerto Cabello (Boettger, 1893); Venezuela (Licht. and Mart., 1856).

Range. The coastal belt and the Llanos. So far as I am aware, the records given here represent the most northerly for the species. To the south it extends as far down as Argentina, where a local race (*L. ocellatus bonariensis*) is recognized by Cei (1956).

Remarks. See remarks under *L. sibilatrix* and *L. bolivianus.*

LEPTODACTYLUS PODICIPINUS PETERSII (Steindachner)

Platymantis petersii Steindachner, 1864, Verhandl. Zool. Ges. Wien.: 254, pl. xvi, figs. 2, 2a, 2c: Marabitanas, Brasil.

Leptodactylus caliginosus Boulenger (not Girard), 1903, Ann. Mag. Nat. Hist., (7) *11*: 481; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45, pl. xi, figs. 14, 15; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 536.

1 (U.P.R. 101) Sn. Fdo. de Atabapo, vi.50.
6 (M.C.Z. 26144-6 — 3 dupl.) Cerro Cosme, x.30.
1 (M.C.Z. 2970) Mérida.
1 (U.M.M.Z. 55551) Lagoon Palma Sola.
2 (U.M.M.Z. 55552-3) La Fría, rt. fork R. Oropito.

Description. Head broader than long; snout subovoid; tongue oval, slightly nicked behind; vomerine odontoids in two little arched series behind the choanae, their anterior convexities not extending beyond the horizontal of the posterior margin of the latter; eyes small, their diameter equal to distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus indistinct; loreal sloping, not concave; tympanum circular, ¾ the eye diameter; first finger longer than the second; subarticular tubercles moderate; a strong tarsal and a distinct metatarsal fold; metatarsal tubercles small but distinct; soles usually tubercular; toes slightly webbed, the web extending to the tips as very conspicuous lateral fringes; heel of the adpressed hind limb extends to the posterior corner of the eye or a little beyond. Skin above, with small tubercles on the posterior ⅔; upper eyelids usually granular; flanks sometimes with round and elongated glandules. Ventral surfaces of the belly and throat smooth; an indistinct discoidal fold on the belly. Breeding male with two pointed tubercles on the inner side of the first digit; no distinct external vocal sac.

Color. Above, grayish brown with occasional darker spots; a dark, anteriorly truncate spot between the eyes is generally limited in front by a light transverse line; snout lighter than the body color; a light, not very distinct, slanting line from lower eyelid to angle of jaw and usually some others in front of these; hind part of the thighs obscurely marbled with light; a not very well defined light line along the lower posterior aspect of thighs; limbs crossbarred, sometimes indistinctly. Ventral surfaces dirty white, sometimes marbled or freckled with brown on the throat, breast and distal portions of the hind limbs; lower lip usually margined with white dots.

Measurements. Snout-vent ♂ 37, ♀ 41; head breadth ♂ 13, ♀ 14; head length ♂ 12.5, ♀ 14; femur ♂ 18, ♀ 17; tibia ♂ 20, ♀ 18.5.

Additional Localities. Albarregas River (A.M.N.H. 10517-9); Arabopó (A.M.N.H. 39758-9; U.M.M.Z. 85197[4]); Bonicito River (U.M.M.Z. 100056); Carayaca (U.C.V. 17); Caripito (U.S.N.M. 17088-9); Casiquiare, 8 mi. above Capibara (A.M.N.H. 23166); El Limón (U.S.N.M. 121146); Los Canales, Planta Eléctrica de Naiguatá (U.S.N.M. 128838); ?Maracay (Lutz, 1927); Mérida (A.M.N.H. 3136; U.S.N.M. 118176; Boulenger, 1903); Petare (U.S.N.M. 121147); Pie de Avila (U.C.V. 110); Pto. Ayacucho, nr. Venado (U.S.N.M. 80666, 80671-5); Río Cotiza, Camino de Galipán (U.S.N.M. 117526, 121137); Río Pescado (A.M.N.H. 23182); Roraima (A.M.N.H. 39753).

Range. All the physiographical provinces of Venezuela, including the Andes to an elevation of at least 1600 m. The species extends from Colombia and Trinidad to Buenos Aires. The race is found in the northern part of the continent and as far south as Bolivia and Minas Gerais.

Remarks. Dr. Cochran has found (1955:328) that *Leptodactylus caliginosus* Girard is a strict synonym of *Leptodactylus ocellatus* (Linné). Specimens from southern Brasil referred to *caliginosus* by various authors are considered by her to be identical with *L. podicipinus* Cope. Such being the case, the name available for the northern form which has been called *L. caliginosus* seems to be *Leptodactylus petersii* (Steindachner).

For the study of *podicipinus podicipinus* and *podicipinus petersii*, I have examined a total of 155 specimens from Colombia, Venezuela, the Guianas, Brasil, Bolivia and Ecuador, and for comparison with these I had a few examples of *melanonotus* from Central America and *validus* from Trinidad.

The change from *petersii* to *podicipinus* seems to occur in Bolivia on the west and in Minas Gerais on the east, but the nature of the change and the direction it follows is not easy to see without resort to statistical measures. There are sufficient specimens in the different museums and it is hoped that this type of analysis can be done in the near future. Meanwhile, the following observations may be helpful. *L. p. podicipinus* differs from *L. p. petersii* in its smaller size (average for 15 adult specimens, 10 ♀♀, 5 ♂♂, 32.2 for *L. p. petersii* and 29.5 for *L. p. podicipinus*), in having a shorter femur (the length of the femur equals half the distance from anus to interorbital line in *podicipinus* and from anus to the middle of the snout [Bolivia] or beyond the tip in *petersii*), in having an interorbital spot that extends much farther back on the dorsum, in the characteristic white spotting on the venter and in lacking a longitudinal, white line along the posterior part of the thighs and a well defined supratympanic fold. *L. p. petersii* has a broader head and usually transverse bars on the upper surface of the hind limbs and brown freckles on the distal lower surface.

In Bolivia, typical *L. p. podicipinus* occurs in Cachuela Esperanza and Rurrembaque but in the Upper Beni (farther south!) it occurs as a larger form, many specimens lose the ventral spots, and the longitudinal, white line in back of the thighs comes out. There is a form in Buena Vista which I think should be referred to the northern race though somewhat divergent from it and possessing certain characters of its own (long, narrow head; gray color; 2 black spots on the sides of the anus). It seems to me that the change from one race to the other is not along a well-defined latitudinal boundary; instead there are many finger-like projections of one race into the "supposed" range of the other. Along the eastern base of the Andes and along the lower course of Río Beni, typical *podicipinus* occurs. However, the more southern Upper Beni specimens show some transitional characters toward the eastern variant occurring in Buena Vista and the latter toward the northern form, which probably meets *podicipinus* on the east and north of this region. In Maracaju, Salobra and Corumbo in Matto Grosso only *podicipinus* seems to occur, while in Minas Gerais both forms exist. *L. natalensis* should perhaps by synonymized with *L. p. petersii.*

In the north, *L. p. petersii* has undergone considerable modification in some places. In Colombia, for example, the species seems to attain enormous (relatively speaking) proportions, while in the Upper Rupununi of British Guiana, specimens with very dark dorsal coloration and densely reticulated ventral surfaces occur. This ventral pattern is found in specimens from other places but in this region it is very distinct and apparently general (A.M.N.H. 46437, 27 untagged specimens).

Leptodactylus validus seems to me referable to this same species and perhaps even *Leptodactylus melanonotus* may be included in the Rassenkreis but these problems are left until a complete study can be made.

Alemán's, 1952, *Leptodactylus* species *aff. petersii* from Turgua may be referable to this form.

LEPTODACTYLUS RUGOSUS Noble

Leptodactylus rugosus Noble, 1923, Zoologica (N.Y.), *3*: 297: British Guiana; Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 2.

7 (U.P.R. 190-1, 62-6) Cerro Turuma Chica, vi.50.
6 (U.P.R. 53-4, 67-70) Pto. Ayacucho, iii.50.
7 (U.P.R. 55-61) Sanariapo, iii.50.
5 (U.P.R. 71-5) Casa de Julián, iv.50.

Description. Snout subovoid, longer than the eye diameter; tongue oval, entire or very slightly nicked behind; vomerine odontoids close together and forming two arched groups behind the choanae, their anterior convexities usually extending to the middle of the inner margin of the latter; eye diameter greater than distance between eye and nostril; interorbital space narrower than an upper eyelid; canthus depressed; loreal sloping, concave; tympanum distinct, circular, ¾ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder; one or two glandular tubercles between angle of jaw and arm; first finger longer than second; fingers and toes distally swollen; tarsal fold slight to moderate, metatarsal absent; an elongate oval inner and a small, rounded, outer metatarsal tubercle; toes practically free, without lateral fringes; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above with irregularly scattered warts of unequal size; flanks usually with numerous round or elongated glandules. Below, smooth, except for the hind part of the thighs and sides of the belly which are grandular; a ventral discoidal fold. Breeding male with a pair of spines on the breast, two pigmented external vocal sacs, numerous spinules on the chin and a pointed tubercle on the inner side of the first digit.

Color. Above, black or brownish gray, sometimes obscurely spotted with a darker shade; several light colored lines radiate from eye to upper lip; a distinctive, white interorbital line and occasionally a pair of vermicular, whitish ones originate in the posterior corner of the eye and converge posteriorly to separate again and form an hour-glass figure on the anterior part of the dorsum; hinder part of the thighs obscurely marbled; limbs crossbarred, the bars not clearly delimited in some specimens. Belly and lower surfaces of limbs white or brownish, uniform or somewhat marbled; throat generally infuscate in the male.

Measurements. Snout-vent ♂ 67, ♀ 67; head breadth ♂ 25, ♀ 25; head length ♂ 24, ♀ 22.5; femur ♂ 31, ♀ 29; tibia ♂ 30, ♀ 31.5.

Habits. The voice of this species is very similar to the noise produced when a stone is thrown into a quiet pool of water. It is usually heard at dusk in the stony places which the animal generally inhabits. Many of the specimens were collected under a large rock on top of a hill of bare granite (Turuma Chica) where the dampness and the small, stingless bees that nested under the stone provided a clear motive for their site preference. All the stomachs of these specimens and of some of those collected elsewhere were full of these bees. Evidently this is not their only food, one of the stomachs also having revealed a pair of beetle elytra.

In Puerto Ayacucho most of the specimens were also found hiding under granitic rocks or in the proximity of them and the same is true for the small specimens collected in Casa de Julián. Here, a small, swift stream runs for about 100 yards over a bed of solid granite. The specimens, together with a few long-tailed tadpoles that very probably belong to this species, were found under a loose stone at the edge of the stream. Very little water reached the stone and the tadpoles seemed to have some difficulty in wriggling about, but stones in deeper water or in muddy places nearby revealed no amphibian life.

The material from Sanariapo comes mostly from the edge of the river (collected at night) with granite rock at not more than a few hundred feet away. A few small and probably recently metamorphosed specimens were seen at a short distance from this place on an extensive ''laja'' of black bare granite that contained water in many of its holes and depressions. Crustaceans and mosquito larvae were also collected in these pools.

I have the impression that *Leptodactylus rugosus* is very much restricted to black, crystallized rock and that it will not be found outside of the Guayana Highlands.

Additional Localities. Auyantepui (A.M.N.H. 46038-9); Border between British Guiana and Venezuela (U.M.M.Z. 85211); Canal Casiquiare, between Colombia and Venezuelan border (A.M.N.H. 23160-2); Puerto Ayacucho, near Venado (U.S.N.M. 80664-73); Puerto Ayacucho (A.M.N.H. 23209-19); Sanariapo (U.S.N.M. 80035-8); Upper Orinoco (Parker, 1936); 20 mi. west of Wiaka Piapu Mts. (U.M.M.Z. 85158 [2]); Wiaka Piapu Mts. (U.M.M.Z. 85209 [2]).

Range. The Venezuelan Guayana. British Guiana, southwestern Colombia and probably northern Brasil.

Remarks Examination of the paratype (A.M.N.H. 3790), now in M.C.Z., and later of the type, has revealed close morphological agreement with the animals reported here, although probably due to the preservative used by the collector, the color is, as described by Noble, reddish brown. His specimens were 16.5 to 41 mm. in snout-vent length.

In reporting on an Upper Orinoco collection in the Brussels Museum, Parker (1936:2) identified three specimens as *L. rugosus* but pointed out that both males in the collection had single nuptial spines while the female was distinctly larger than Noble's (49 mm.). Noble's specimens did not have nuptial spines.

Leptodactylus rugosus Melin, 1941, is preoccupied by *L. rugosus* Noble. For Melin's form, Lutz and Kloss have created the name *L. melini.* I regard this form as a synonym of *L. marmoratus hylaedactylus* (see page 35).

LITHODYTES LINEATUS (Schneider)

Rana Lineata Schneider, 1799, Hist. Amphib., *1*: 138.

1 (U.P.R. 104) La Culebra, 1000 ft., vi.50.

Description. Physiognomy of *Dendrobates;* snout somewhat truncate; tongue oval, entire and free behind; vomerine odontoids in two short, slightly arched series behind the choanae, their anterior convexities extending to the middle of the inner margin of the latter; interorbital space slightly broader than an upper eyelid; tympanum almost as large as the eye; canthus not distinct, rounded; loreal nearly vertical, not distinctly concave; first finger longer than second; tips of fingers and toes distally swollen; a moderate tarsal and a metatarsal fold; toes free, with an indication of a lateral fringe; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above and on sides of the head, lower lip and limbs studded with regularly distributed tubercles; on the thighs the tubercles are limited to a central longitudinal band. Ventral surfaces, smooth.

Color. Above, dark grayish-brown with two longitudinal stripes that begin at the tip of the snout and end in the groins; several red spots on the thighs, hidden portions of the tibiae, tarsii and feet. Below, grayish, with round white spots on the belly and throat.

Measurements. ♂ snout-vent 45.5; head breadth 8.5; head length 8.5; femur 13.5; tibia 9.5.

Habits. The only specimen was collected at night at the edge of a savanna, more toward the forest side than to the grassland.

Range. The Venezuelan Guayana. Colombia (Río Garagoa), Trinidad, British Guiana, Ecuador and probably northern Brasil.

Remarks. I have examined very large specimens of this species (50 mm.) and all of them have T-shaped terminal phalanges.

There is practically no difference between animals from Trinidad, British Guiana, Venezuela and Ecuador.

Key to the Species of ELEUTHERODACTYLUS *Reported from Venezuela*

I. First finger longer than second.
  A. Head and mouth very large; dorsum tubercular and ridged .... *cornutus maussi*
II. First finger equal to, or shorter than second.
  A. Tympanum ½ to ⅔ the eye diameter.
    1. First finger shorter than second.
      a. Margins of the frontoparietals elevated; skin above smooth; vomerine teeth oblique .... *briceni*
      b. Margins of the frontoparietals not elevated; skin above finely granular; vomerine teeth transverse .... *turumiquirensis*
    2. First finger equal to second.
      a. Heel of the adpressed hind limb extends to the nostril or beyond .... *terraebolivaris*
      b. Heel of the adpressed hind limb does not reach the nostril.
        1. Thigh ½ the length between anus and anterior corner of the upper eyelid; eye diameter shorter than distance between eye and nostril; belly granular .... *brachypodius*
        2. Thigh ½ the length between anus and middle or tip of the snout; eye diameter equal to distance between eye and nostril; belly smooth or granular .... *conspicillatus ileamazonicus*
  B. Tympanum not more than ⅓ the eye diameter.
    1. Tympanum small and indistinct; disks small, narrow, more or less pointed .... *stenodiscus*
    2. Tympanum distinct, even if small; disks not pointed.
      a. A brown or black lateral band.
        1. Eye diameter greater than distance between eye and nostril .... *orocostalis*
        2. Eye diameter not greater than distance between eye and nostril .... *bicumulus*
      b. No lateral band.
        1. A white (red?) area at the groin and another under the arm .... *williamsi*

2. Not as above.
   a. Eye diameter greater than distance between eye and nostril.
      (1) Anterior and posterodistal portions of thighs stained with orange brown; a W-shaped scapular marking .... *rozei*
      (2) Not as above .... *orocostalis*
   b. Eye diameter not greater than distance between eye and nostril.
      (1) Disks not broader than the tympanum; thighs usually tinged with red .... *urichi*
      (2) Disks broader than the tympanum; thighs not tinged with red.
         a. Heel extending to the nostril or beyond .... *reticulatus*
         b. Heel not extending to the nostril.
            (i) Thighs with white spots and/or bars; 36 mm.; Coastal Range .... *racenisi*
            (ii) Thighs without white spots or bars; 15-22 mm.; Venezuelan Guayana . . *marmoratus*

C. Tympanum absent[1] .... *anotis*

ELEUTHERODACTYLUS CORNUTUS MAUSSI (Boettger)

Hylodes maussi Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 39: Puerto Cabello, Venezuela; Nieden, 1923, Das Tierreich. Anura I: 466; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

1 (M.C.Z. 10178, juv.) Pto. Cabello, 1895.
1 (U.M.M.Z. 56774, juv.) Sn. Esteban.
1 (U.C.V. 38) Guamitas, iii.51.
7 (U.C.V. 19, 106, 113, 116-8, 1159) Rancho Grande, 49-51.

Description. Head large; snout broad, subovoid, sloping toward the front; vomerine odontoids forming two slightly arched groups behind the choanae, their anterior convexities touching the posterior margin of the latter; tongue rounded, entire and ⅓ free; interorbital space more or less as broad as an upper eyelid; margins of the frontoparietals prominent; eye diameter equal or slightly shorter than distance between eye and nostril; canthus obtusely angular; loreal strongly sloping, concave; tympanum distinct, ⅔ the eye diameter; a row of four or more tubercles along the forearm; metacarpal tubercles large, subarticulars very large, rounded and prominent, especially on the first finger; fingers free but with thick lateral fringes, including the outside of the first; first finger longer than second, which is more or less equal to fourth; digits distally dilated; a tarsal fold; an indistinct, outer and a small, elongated, inner metatarsal tubercle; subarticular tubercles of toes large, conical and very prominent; disks of toes small but distinct; heel of the adpressed hind limb extends to between eye and nostril. Skin above and on the sides of the head and flanks tubercular; upper eyelid tubercular, one of the posterior tubercles being longer than the others; a pair of longitudinal, curved ridges from behind the upper eyelid to the post-scapular region; usually a cross ridge or row of tubercles unite the two longitudinal ridges in the middle, forming with them a)—(figure; behind this figure, two other ridges, usually less prominent and closer together occur; another very short, oblique ridge or series of tubercles at the angle of the mouth; on the limbs some rows of tubercles fuse to form oblique ridges. Throat, belly and thighs thickly granular.

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[1] Present, but small and indistinct in young specimens, which can be distinguished by having red on the venter and/or limbs.

Color. Dark gray (pinkish in life), the ridges and some of the tubercles being sometimes of a darker color; a light line from lower eyelid to near the angle of the mouth is generally followed anteriorly by a triangular darker spot, another light line and another dark spot; limbs sometimes crossbarred; posterior part of the thighs of the same color as the body. Below, dark brownish gray, the granules being lighter than the ground color; throat and limbs usually darker than the belly.

Measurements. ♀ snout-vent 59.5; head breadth 24; head length 19; femur 26; tibia 26.5.

Habits. In Venezuela this appears to be mainly a subtropical forest form.

Additional Localities. Puerto Cabello (Nieden, 1923; Lutz, 1927 [cited from Boettger, 1893]).

Range. The Coastal Range and probably the Andes. The species extends from Colombia to Ecuador.

Remarks. U.C.V. 38 has a much lighter color than the Rancho Grande specimens, the limbs are lighter than the body color, and the venter is plain white.

Topotypical specimens of *E. cornutus cornutus* (M.C.Z. 19640-2; Canelos, Ecuador) have a more depressed snout than *maussi;* the dorsum occasionally has extensive dark spots (M.C.Z. 19642), the posterior part of the thighs is black with light pinkish (red?) spots, and the groins, anteroventral and ventrodistal portions of the thighs are equally spotted or more broadly marbled; there are large pinkish spots on the hidden portions of the tibia and tarsus and in specimen 19642, one of the lines that radiates from eye to lip is broad and very distinct.

It is very possible that *Hylodes sulcatus* Cope, 1874, from Nauta, Perú and *Ctenocranius koki* Melin, 1941, from Taracúa, Brasil, are conspecific with *Eleutherodactylus cornutus* (Espada), 1870, from San José de Moti, Ecuador. The first, however, is described as having an areolate belly.

If the large-headed *Eleutherodactylus* of the *cornutus-biporcatus* group is found to constitute a genus, the name *Strabomantis* Peters, 1863, will probably be the available name while *Limnophys* Espada, 1870, and *Ctenocranius* Melin, 1941, will become synonyms. So far, I do not think that the characters mentioned by Melin are sufficient to separate the two groups.

ELEUTHERODACTYLUS BRICENI (Boulenger)

Hylodes briceni Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 481: Mérida, Venezuela; Nieden, 1923, Das Tierreich. Anura I: 466; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39.

2 (M.C.Z. 3888, 7601, cotypes) Mérida.

Description. Snout subovoid; tongue broadly oval, entire or indistinctly nicked and free behind; vomerine odontoids forming two short, oblique and close together series behind the choanae, converging posteriorly and not extending outwards beyond the vertical of the inner margin of the latter; interorbital space slightly concave, broader than the upper eyelid; margin of the frontoparietals slightly elevated; eye diameter equal to distance between eye and nostril; canthus distinct, somewhat curved; loreal sloping, concave; tympanum small, not very distinct, about ½ the eye diameter; a pair of indistinct metacarpal tubercles; subarticular tubercles moderate, round; first finger shorter than second; disks small, truncate, equal or slightly smaller than the tympanum; disks of the toes smaller than those of the fingers; an indistinct outer, and an oval, inner metatarsal tubercle; toes free; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth. Below, smooth in the throat, breast and central part of the belly; sides of the belly sometimes with flat, irregular sized granules.

Color. Above, brown with darker, sometimes chevron-shaped markings; an interorbital band; dark, narrow canthal and supratympanic streaks; flanks brown with darker reticulations or light centered, dark brown spots; limbs diffusely crossbarred. Below whitish, reticulated or marbled with brown.

Measurements. Snout-vent ♂? 28, ♀ 36; head breadth ♂? 10, ♀ 16; head length ♂? 9, ♀ 12.5; femur ♂? 11.5, ♀ 16; tibia ♂? 13, ♀ 17.5.

Additional Localities. Mérida (U.M.M.Z. 46461, 51262, cotypes; Nieden, 1923); nr. Mérida (A.M.N.H. 10507).

Range. The subtropical zone of the Mérida Andes.

Remarks. The species has, even when preserved, a very unique look about the eyes that makes it easily distinguished anywhere.

The two folds that were described on the anterior part of the back were only detected in U.M.M.Z. 51262, probably a male.

ELEUTHERODACTYLUS TURUMIQUIRENSIS sp. n.

Type. American Museum of Natural History No. 22557, a ♀ from La Trinidad, Mt. Turumiquire, in cave at 5,500 ft. Coll., Tate and Clements.

Diagnosis. A large *Eleutherodactylus* with broad head, transverse vomerine teeth, curved canthus rostralis, tympanum ½ the eye diameter, no outer metatarsal tubercle, heel extending to between eye and nostril, and light colored (red?) spots on the anterior part of the thighs.

Description. Head as broad as long; snout broad, subovoid; tongue wide, emarginate and free behind; vomerine odontoids small, in two transverse groups behind the small, round choanae; eye diameter shorter than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus curved, well defined; loreal strongly sloping, concave; tympanum small, ½ the eye diameter; two moderate metacarpal tubercles; subarticular tubercles moderate; disks large, about ¾ the size of the tympanum; first finger reaching the base of the disk of the second; femur half the length of the body; no outer metatarsal tubercle; toes free, their disks smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above, finely granular, the granules being smaller in the head region. Below, smooth on the throat, chest and antero-central portion of the belly; rest of the belly and posterior part of the thighs granular.

Color. Above, mostly plain brown with an obscure interorbital bar and two other diffuse dark spots on the scapular region; upper lip with dark, vertical bars; thighs, hidden portions of the tibiae and posterior parts of the flanks with several large, yellowish (red?) spots. Below, white, marbled on the throat and more loosely marbled (some brown reticulations) on the belly.

Measurements. ♀ snout-vent 40; head breadth 14; head length 14; femur 20; tibia 21.5.

Remarks. The paratypes are both females with the same data as the type and agreeing in most characters:

A.M.N.H. 22558, snout-vent 46; head breadth 17; head length 16.5; femur 21.5; tibia 24. The spots on the limbs and flanks are larger and much better defined; there is a very small and indistinct outer metatarsal tubercle.

A.M.N.H. 22559, snout-vent 39.5; head breadth 14; head length 14; femur 20; tibia 23. This specimen is rather desiccated; there are no distinct light spots on the thighs and tibiae, but, on the other hand, there are some dark, lightly margined ones. The heel reaches the tip of the snout.

The species is quite distinct from everything known from Venezuela.

ELEUTHERODACTYLUS TERRAEBOLIVARIS sp. n.

Hylodes gollmeri Peters, 1863, Monats. Akad. Wissensch. Berlin: 409; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

Hylodes gollmeri Nieden, 1923, Das Tierreich. Anura I: 464 (part).

Type. Museum of Comparative Zoology, no. 31062, a ♀ from Rancho Grande, Edo. Aragua. Coll. J. A. Rivero, 20 Dec. 1958.

Diagnosis. An *Eleutherodactylus* of moderate size, with long snout; sharp canthus rostralis; eye diameter shorter than distance between eye and nostril; broad disks; heel of the anteriorly adpressed hind limb extending to the tip of the snout or beyond; granular venter; no femoral spots; two small, black spots on the scapular region, and usually, two other black spots on the snout, in front of the eyes.

Description. Head longer than broad; snout long, subelliptical; tongue oval, emarginate or free behind; vomerine odontoids in two oblique series behind and between the choanae, their posterior extremities directed inwards; eye diameter shorter than distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus angular; loreal almost vertical, scarcely concave; tympanum distinct, ⅔ the eye diameter; a supratympanic fold from posterior corner of the eye to shoulder; an indented outer, and an oval, prominent, inner metacarpal tubercle; subarticular tubercles conical, distinct; first finger equal to second; disks truncate, about ⅓ the size of the tympanum; an indistinct, short tarsal fold originating below the middle of the tarsus and extending to the inner metatarsal tubercle; toes free; heel of the adpressed hind limb extending to beyond the tip of the snout. Skin above and on the flanks finely shagreened. Throat and anterior part of the belly, smooth; posterior part of the belly with small granules.

Color. Above, brown, with irregular, obscure spots; some of these chevron shaped; two small, elongated spots on the snout; two rounded, small scapular spots and two smaller ones in back of these; loreal region, especially the upper part, darker than the rest of the head; tympanum traversed above by a black supratympanic streak; limbs crossed by dark, light margined bars. Ventral surfaces white, uniform except on the limbs, where some infuscation occurs.

Measurements. ♀ Snout-vent 31; head breadth 10.9; head length 12.7; femur 11.3; tibia 18.7.

Habits. The species is quite abundant in the subtropical forests of the Coastal Range, occurring on the margins of streams together with *Atelopus c. cruciger* and *Prostherapis t. trinitatis.*

Additional Localities. Avila, Cerro (U.C.V. 120-3, U.P.R. 653); Bejuma (U.M.M.Z. 55545); Rancho Grande (U.C.V. 18, 72, 105).

Range. The Coastal Range of Venezuela. (See below.)

Remarks. The following specimens are designated as paratypes: U.S.N.M. 117527-36, 128807-34, Los Canales; U.S.N.M. 128835, Quebrada Chacaíto; U.S.N.M. 128836, Camino de Galipán. Río Cotiza; U.S.N.M. 128884, Curupao; U.M.M.Z. 55545, Bejuma; U.C.V. 120-3, Cerro Avila; U.C.V. 18, 72, 105, Rancho Grande; U.P.R. 653, Pie del Avila. In general physiognomy all paratypes agree with the type, but the following variations may occur:

1. The vomerine teeth may be very strong and joining in the middle.
2. The heel of the adpresesd hind limb may only extend to the tip of the snout.
3. The dorsal surfaces are occasionally granular and/or with scattered tubercles.
4. Two small tubercles are generally present on the snout, in the middle of the two black spots.
5. Two scapular spots are present in greater or lesser degree of distinctness in all individuals.
6. The type is an exception in having an almost smooth belly; in all paratypes the posterior part of the belly is distinctly granular, the granules being larger than the dorsal granules.

7. A narrow vertebral line and sometimes two broad paravertebral bands may be present in some individuals.
8. Adult size seems to be variable. Specimens of 50 mm. have been measured.
9. Some of the specimens from Cerro Avila at U.C.V. were greenish gray when fresh.

Examination of a specimen labeled as "Typus" of *Eleutherodactylus gollmeri* (Berlin, Mus. 3168, Caracas) reveals this animal to represent the Central American form currently known as *Eleutherodactylus lanciformis,* an animal well characterized by its narrow disks and smooth belly. As Peters' description of *E. gollmeri* also corresponds to the Central American form, it appears that the type was somehow mislabeled or that a collection of Central American frogs got mixed with one from Venezuela, with the result that the name *E. gollmeri* has persistently, though incorrectly, been applied to the Venezuelan species. The name *Eleutherodactylus terraebolivaris* is here suggested for the Caracas and Coastal Range form previously known as *E. gollmeri.*

Under the name of *E. gollmeri,* a frog has been reported from Ecuador (Parker, 1936; Andersson, 1945; Boulenger, 1882; Peracca, 1904), Bolivia (Andersson, 1906), Matto Grosso (Boulenger, 1903), and Orgel Gebirge, Brasil (Bauman, 1912). The record from Orgel Gebirge probably refers to *E. güntheri* while that from Matto Grosso may represent the *E. conspicillatus ileamazonicus* here described. It seems to me that two specimens from Bolivia at M.C.Z. (10094-5) represent *E. longirostris* and that may also be the case with other records from Bolivia and Ecuador. Andersson (1945:28) seems to include a composite of *E. c. conspicillatus* and perhaps *E. longirostris,* under his *E. gollmeri.*

Some specimens of *E. terraebolivaris* may be almost impossible to separate morphologically from *E. c. conspicillatus,* especially if in the latter, thigh spots are indistinct and webs are lacking (as they sometimes are). *E. terraebolivaris* is always granular on the belly, even although in most cases, the granules may be restricted to the posterior half. *E. c. conspicillatus* is usually smooth below, and when granular, the granules are usually finer than the dorsal granules. One can say that if it is absolutely smooth it is not *E. terraebolivaris*, but the opposite cannot be said of *E. c. conspicillatus.*

E. conspicillatus ileamazonicus is also similar to *E. terraebolivaris*, but it is apparently separated from the range of that species (here presumed to be limited to the subtropical regions of the Coastal Range of Venezuela) by the whole Llanos. Neither of the two forms has been recorded from the Guianas nor the Delta Region, and *terraebolivaris* is not known from the easternmost section of the Coastal Range. So far as known, the two forms are thus completely discontinuous in their ranges. On the other hand, *E. c. conspicillatus* has been collected by Stebbins at Meta, Colombia (*vide*), and if Boulenger's "*E. gollmeri*" from Matto Grosso represents *E. conspicillatus ileamazonicus,* it would follow that the race would occupy most of the Amazonian region, west to the Andes, where the typical form occurs.

The proposed relationship of *E. c. conspicillatus* and *E. c. ileamazonicus* is admittedly based on little evidence, but the morphological similarity of frogs belonging to this general group of *Eleutherodactylus* is so great, and the relationships between each other are so obscure at present that it has not been considered desirable to propose a new species name for the Amazonian form.

Related to *E. terraebolivaris* are *E. longirostris*, from Bolivia and Ecuador, and Central American *E. gollmeri* and *E. fitzingeri*, this last a species which may be found to be conspecific with *E. c. conspicillatus. Conspicillatus, gollmeri* and *longirostris* may sometimes have the scapular and snout spots that are found in *E. terraebolivaris.*

Alemán's, 1952, *Eleutherodactylus* cf. *gollmeri* from Turgua most probably refers to this species.

ELEUTHERODACTYLUS BRACHYPODIUS sp. n.

Type. Museum of Comparative Zoology No. 28568, a ♀ from the Upper Cunucunuma region, Territorio Amazonas. Coll. J. A. Rivero, May to June, 1950.

Diagnosis. A large *Eleutherodactylus* with long snout, tympanum ⅔ the eye diameter; first finger as long as the second and very short hind limbs, the heel of which does not reach the nostril.

Description. Head longer than broad; snout long, subelliptical but with a rather blunt tip; tongue broad, granular, emarginate and free behind; vomerine odontoids in two short, oblique groups behind and between the choanae, their posterior extremities convergent; eye diameter slightly shorter than distance between eye and nostril; interorbital space a little narrower than an upper eyelid; canthus well defined; loreal scarcely oblique, slightly concave; tympanum ⅔ the eye diameter; a supratympanic fold from posterior corner of the eye to shoulder; a terminally divided palmar and an oval, more prominent, inner metacarpal tubercle; subarticular tubercles moderate; first finger as long as second; disks truncate, about ⅓ the diameter of the tympanum; apparently an indication of a tarsal fold on the distal half of the tarsus; metatarsal tubercles moderate; toes free, disks of the toes smaller than those of the fingers; thigh half the length between anus and anterior margin of upper eyelid; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above, shagreened; flanks granular. Below, smooth on the throat, breast, and central part of the belly; sides of the belly and hind part of the thighs granular.

Color. Above, very dark slate gray, almost black; snout rather browner; a black canthal and fine supratympanic streak; tympanum chestnut; lower part of the loreal region and lower part of the flanks grayish white; limbs grayish with darker diffuse spots. Below, dirty white.

Measurements. ♀ snout-vent 38.5; head breadth 14; head length 15; femur 16; tibia 18.

Remarks. U.P.R. 213, a ♀ from the forest floor of Mt. Marahuaca, 5,000 ft. and U.P.R. 210, a ♀ from a "conuco" or Indian plantation at La Culebra, 1000 ft. are very similar in structure to *E. brachypodius* but have not been designated as paratypes on account of some differences that may or may not be of significance. In both, the hind limbs look longer, the heel reaches between eye and nostril, the color above is much lighter (yellowish gray) and with irregular darker markings, there is no distinct separation between dorsal and ventral color, and the canthus in no. 213 is more vertical. Both specimens contain eggs and they agree in structural characters.

Eleutherodactylus brachypodius differs from *E. gollmeri* in its less tapering snout, finely granular posterior part of the belly, absence of scapular spots and much shorter hind limbs; from the Venezuelan *E. conspicillatus* in its less tapering snout, light loreal region, absence of chevron markings on the dorsum and much shorter hind limbs.

Unfortunately, the exact locality where the type of *E. brachypodius* was collected was not recorded. From my field notes I deduct that it is either Casa de Julián or Marahuaca, 4,050 ft.

ELEUTHERODACTYLUS CONSPICILLATUS ILEAMAZONICUS ssp. n.

Figure 2

Hylodes frenatus Boettger, 1896, Ber. Senckenb. Naturf. Ges., LIV (nom. nud.).

Type. Museum of Comparative Zoology No. 30397 a ♂ from Temiche, Mt. Marahuaca, 4050 ft., S. Venezuela. Coll. J. A. Rivero, May 1950.

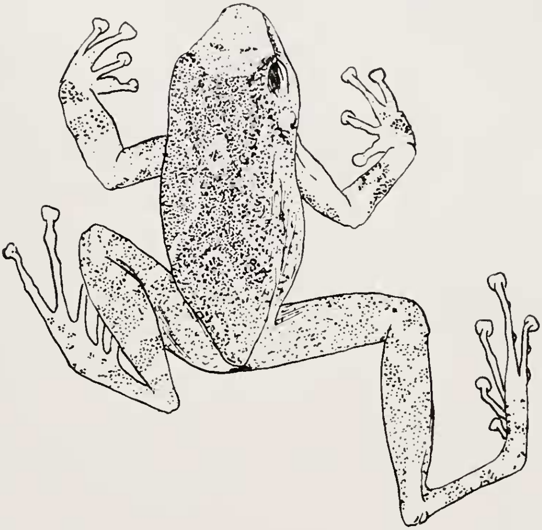

Fig. 2. *Eleutherodactylus conspicillatus ileamazonicus* ssp. n. Type M.C.Z. 30397.

Diagnosis. A medium-sized *Eleutherodactylus* differing from the typical form in its smaller size, shorter legs and in lacking toe webs and white spotting or marbling on the posterior part of the thighs.

Description. Head longer than broad, snout subelliptical; tongue oval, free and nicked behind; vomerine odontoids in two strongly oblique and separated groups behind and between the small, round choanae, their posterior extremities convergent; eye diameter equal to distance between eye and nostril; interorbital space more or less as broad as an upper eyelid; canthus well defined; loreal almost vertical, slightly concave; tympanum distinct, ⅔ the eye diameter; a supratympanic fold from posterior corner of the eye to shoulder; a divided outer and an oval, inner metacarpal tubercle; subarticular tubercles distinct, rounded; fingers free, the first more or less equal to second; largest disk about ⅓ the size of the tympanum; a round outer and an oval inner metacarpal tubercle; toes free; heel of the adpressed hind limb extends to between eye and nostril. Skin above, finely granular, with larger granules or tubercles scattered among the finer ones especially behind the eyelids and toward the flanks. Below, granular on the sides of the throat, belly and hinder aspect of thighs. A ventral discoidal fold and a moderate, subgular vocal sac.

Color. Above, brown with irregular, confluent markings on the back; one of the dorsal markings forms a chevron in the middle of the dorsum; another, forming an interorbital spot, sends two extensions backward to the sides of the chevron; two dark dots on the snout, in front of the eyes, and in the center of each of these a small tubercle; a dark supratympanic and a canthal streak; loreal region lighter than the body color and with a few short dark bars on the lip; a few dark spots on the anterior distal border of the thighs; limbs crossbarred; posterior part of the femur uniform brown, of the tarsus and sole dark brown. Below, brownish white.

Measurements. ♂ snout-vent 31.6; head length 12.8; head breadth 11; femur 16; tibia 17.6.

Habits. All specimens were collected on the forest floor or on the stems of plants at not more than a foot from the ground. These frogs were heard at dusk and dawn but not during the intervening hours of the night. The species apparently prefers "conucos" and cleared areas where the conditions are not very humid or the vegetation dense. The voice is something like a "toot, toot, toot."

Range. The Venezuelan Guayana. The species extends from the Colombian Andes to Perú. It has been reported from east and west of the Andes and also from Matto Grosso (Cope, 1887a). A number of records of *E. gollmeri* from Ecuador (Boulenger, 1882; Peracca, 1904; Parker, 1936; Andersson, 1945) may refer to this species or to *E. longirostris*.

Remarks. The following specimens are designated as paratypes:

U.P.R. 105, a ♀ from Alto Cunucunuma. Coll. J. A. Rivero, April 1950. Snout-vent 39; head length 15.6; head breadth 14.1; femur 19; tibia 22.

U.P.R. 107, a ♂ from Mt. Marahuaca, 4050 ft. Coll. J. A. Rivero, May 1950. Snout-vent 29.7; head length 11.7; head breadth 11; femur 15.7; tibia 17.

U.P.R. 38, an immature specimen from Mt. Marahuaca, 4050 ft. Coll. J. A. Rivero, May 1950. Snout-vent 18.3.

U.P.R. 108, a ♂ from Tapara, Alto Cunucunuma. Coll. J. A. Rivero, April 1950. Snout-vent 24; head length 10.4; head breadth 9.5; femur 13; tibia 14.4.

U.P.R. 212, a ♂ from Tapara, Alto Cunucunuma. Coll. J. A. Rivero, April 1950. Snout-vent 26.7; head length 11; head breadth 9.5; femur 12.5; tibia 15.5.

Paratypes agree morphologically with the type except for the fact that the tympanum can only be ½ the eye diameter and the heel of the adpressed hind limb may reach only to the anterior corner of the eye. All specimens from Mt. Marahuaca or the Cunucunuma River have irregular or chevron-shaped markings on the dorsum, but in the specimen 211 from Mt. Duida, they are not apparent. The basic body color may be of a variable shade of brown and the loreal region may be lighter or darker than the body color. The two snout dots are present in all specimens from Mt. Marahuaca, although not too well defined in some. There is no marbling or spotting on the hind part of the thighs of any of the examples.

Other material examined includes specimens from the foothills of Mt. Duida, 750-800 ft. (A.M.N.H. 23205, 23176); Caño Pescado, 325 ft. (A.M.N.H. 23183-4); Cerro Yapacana (U.S.N.M. 83950); Iguapo, S. Venezuela (Senckenb. Mus. 51844-5) and Mt. Duida, 2000-4000 ft., (U.P.R. 211). The latter is more or less of a solid color (some darker scribblings may be detected) and does not show the two snout dots of the type and paratypes.

The Venezuelan form differs from Ecuadorian material in its smaller size (males especially are smaller), total absence of web in the toes, lack of any marbling or spotting on the posterior aspect of the thighs, and shorter hind limbs. Out of 43 specimens of Ecuadorian and Peruvian *E. conspicillatus* examined, only 4 did not have any web (the largest four — one of them 65.1 mm. in snout-vent length) while all of them had some marbling or spotting (even if not too clear in a few) on the posterior aspect of the thighs.

Morphologically, this species is almost identical with *E. terraebolivaris* but the Venezuelan race can be distinguished by its darker color, smooth or finely granular belly and shorter hind limbs. The length of the femur from the anus is included twice in the distance between anus and tip of the snout in *conspicillatus ileamazonicus* but in *gollmeri* the double measurement usually extends beyond the tip of the snout. In *E. c. ileamazonicus* the extended heel does not pass beyond the nostril while in *E. terraebolivaris* it usually extends considerably beyond the tip of the snout. A good distinguishing character is the appearance of the belly. In *E. c. ileamazonicus* the belly is smooth on the center or finely granular (the granules not larger than the dorsal granules) while in *E. terreabolivaris* the ventral granules are large and distinct.

A 31 mm. ♀ specimen of *E. conspicillatus,* from nr. Sn. Martín, Meta, Colombia (Berkley) has the thigh marbling of the topotypical form. The species has also been reported from Matto Grosso (Cope, 1887a), but these examples are said to have lacked the thigh marblings of the Andean animal.

The type and one paratype (U.P.R. 105) are very similar in dorsal pattern and body form to Boulenger's (1882, pl. xiv) figure of *E. conspicillatus.*

Hylodes peruvianus Melin, 1941, is probably a synonym of *E. c. conspicillatus.*

ELEUTHERODACTYLUS STENODISCUS Walker and Test

Figure 3

Eleutherodactylus stenodiscus Walker and Test, 1955, Occ. Pap. Mus. Zool. Univ. Mich. No. 561: 2. Pico Periquito, Rancho Grande.

2 (U.M.M.Z. 109870, paratypes) Pico Periquito, Rancho Grande, 1375 m.

Description. Head slightly longer than broad; snout long, subovoid; tongue rounded, ⅓ free, slightly nicked behind; vomerine odontoids small, oblique, converging posteriorly, between and immediately behind the round choanae, their anterior extremities at level with the posterior margin of the latter; eye large, its diameter as long as the snout; interorbital space slightly broader than an upper eyelid; canthus well defined but rounded; loreal moderately sloping, concave; tympanum very small and indistinct, less than ⅓ the eye diameter; two tubercles at the angle of the jaw; two or three small, indistinct tubercles on the arm close to the wrist; first finger shorter than second, which is more or less as long as fourth; an elongated inner and a divided outer metacarpal tubercle; disks subtriangular, pointed, that of the first finger much smaller than others; a few tubercles at the heel, one or two of which are very prominent and distinct; a slight tarsal fold; metatarsal tubercles small; subarticulars small, not prominent; toes free, their disks pointed, as large as those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above shagreened or granular, with scattered, small tubercles; upper eyelids with several small tubercles and a distinct prominent one near the top. Below, granular on the belly and posteroventral aspect of the thighs; throat smooth.

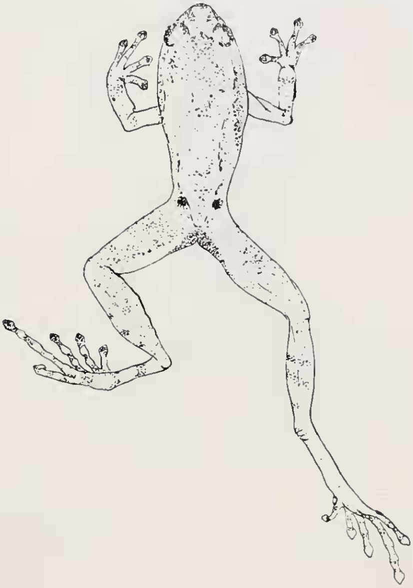

Fig. 3. *Eleutherodactylus stenodiscus* Walker and Test. Paratype U.M.M.Z. 109870.

Color. Above, grayish brown, with diffuse darker blotches; eyelids dark brown; a light interorbital line diffuses anteriorly and blends with the brown color of the snout; a dark brown canthal spot and a supratympanic streak; two brown bars radiating from eye to upper lip; between these, and anterior to the foremost, two other smaller dark spots; white labial dots occur between the brown bars and spots; two distinct, rounded brown spots above the groins; seat with a brown triangular spot that extends distally halfway on the posterior part of the thighs; thighs with or without crossbars above; humerus, tibia and tarsus with dusky crossbars or diffuse blotches. Ventral surfaces light brownish, with greater infuscation on the throat and limbs; lower lip margined with white dots; tarsus and foot dark brown.

Measurements. Snout-vent 18.5; head length 6.9; head breadth 6.8; femur 8.5; tibia 9.5.

Habits. Collected in the forest floor at 1375 m., "where there were considerable accumulations of leaf litter" (Walker and Test, *op. cit.*).

Range. Known only from the type locality.

Remarks. The main variation is said to be in dorsal pattern. The lumbar spots were absent in 5 of the 24 individuals available to Walker and Test, but even those 5 had a dorsolateral stripe terminating above the groin. In paratype 109870 (field no. AB 4392), there are 2 small spots in front of the lumbar ones. A dusky diagonal bar from shoulder to sides is present in this specimen, and according to the description, in the type and all paratypes. In 109870 (field no. AB 4380) it is, however, limited to a small diffuse spot above the shoulder. Chevron-shaped markings or longitudinal stripes are described for some of the specimens.

E. stenodiscus is similar to the Jamaican *E. andrewsi* and to a lesser extent, to *E. emiliae* from Cuba. Both of these species have pointed disks, two lumbar spots and a black seat, but the tympanum is larger and more distinct in the two Antillean forms, and in *E. emiliae* the eyes are small and the head much broader at the base.

Among the Venezuelan *Eleutherodactylus*, *stenodiscus* can be easily distinguished by its characteristic coloration, indistinct, almost hidden tympanum, and pointed disks.

ELEUTHERODACTYLUS OROCOSTALIS sp. n.

Figure 4

Type. Universidad Central de Venezuela No. 2003, a ♀ from El Junquito, D.F. Coll. Roze, 12 April 1951.

Diagnosis. A small *Eleutherodactylus* with subtriangular snout; head slightly broader than long; eye diameter greater than distance between eye and nostril; heel extending to the eye; dorsum tubercular, with a large tubercle on the upper eyelid and another at the heel; color variable, usually black or very dark brown above; marbled or reticulated below.

Description. Head slightly broader than long; snout subtriangular; tongue oval, free and nicked behind; vomerine odontoids in two small, rounded groups behind and between the choanae, their exterior extremities not extending to the vertical of the inner margin of the latter; eyes protuberant, their diameter longer than distance between eye and nostril but slightly shorter than the snout; interorbital space as broad as an upper eyelid; canthus well defined; loreal little inclined, concave; tympanum distinct, ⅓ the eye diameter; two small tubercles between tympanum and arm; others between elbow and wrist; metacarpal tubercles small; first finger shorter than second; first disk small and narrow, only slightly broader than phalanges; others relatively large, almost as large as the tympanum; a large tubercle at the heel and other smaller ones at the tarsus; a rounded outer and an elongated inner metatarsal tubercle; subarticular tubercles moderate; heel of the adpressed hind limb extends to the middle of the eye. Skin above, tubercular; upper eyelid with a large tubercle and other smaller and less distinct ones; upper flanks tubercular. Belly granular.

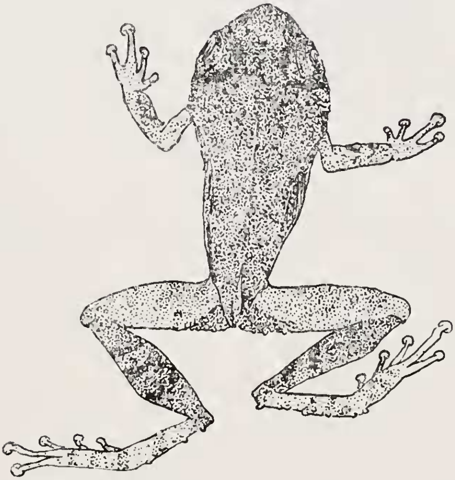

Fig. 4. *Eleutherodactylus orocostalis* sp. n. Type U.C.V. 2003.

Color. Above, very dark brown, almost black; limbs with narrow oblique listing over a lighter background. Below, dusted and marbled with brown.

Measurements. ♀ snout-vent 20.5; head breadth 8.2; head length 8; femur 10.1; tibia 10.2.

Habits. During the daytime, *E. orocostalis* is usually found under the leaf litter in heavily wooded areas.

Remarks. Paratypes (U.C.V. 2001-7, El Junquito) agree in morphological characters with the type except for the fact that the heel may extend to the anterior corner of the eye or slightly beyond, and the dorsal skin may be less or more tubercular than in the type specimen. In size, none of the examples available surpasses the type.

Coloration is quite variable, the following patterns being the most common:

a. Yellowish brown, tan or chestnut with a dark brown spot on the middle of the body between occiput and sacrum and two broad, dark brown, lateral bands that cover the loreal region and extend posteriorly to the groins.

b. Very dark brown with darker, almost black markings.

c. Variegated with greenish gray and dark gray.

The loreal region may be of a solid color or with distinct crossbars that radiate from eye to upper lip; flanks solid brown or with spots or oblique light and dark bands; limbs distinctly crossbarred, the bars on the thighs being sometimes separated by white spaces; posterior part of the thighs solid brown or with obscure, small, lighter spots. All specimens have a large tubercle on the upper eyelid, another at the heel, two or three at the arm and two or three at the tarsus. The heel tubercle is mammillary and very distinct in some specimens. In most, a W is formed by four or five tubercles on the scapular region.

E. orocostalis is similar to *E. rozei* (see "Remarks" under that species) and, to some extent, to the young of *E. bicumulus*. In this latter species the snout is longer, the orbital diameter not being greater than the distance between eye and nostril, the dorsum is not tubercular, and the heel extends anteriorly to between eye and nostril.

ELEUTHERODACTYLUS BICUMULUS (Peters)

Hylodes bicumulus Peters, 1863, Monatsb. Akad. Wissensch. Berlin: 410: Caracas; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus. ed. 2: 215; Nieden, 1923, Das Tierreich. Anura I: 465; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39.

2 (Berlin Mus. 4899, cotypes) Caracas

Description. Snout subovoid; tip of snout rounded; tongue large, slightly nicked behind; vomerine odontoids in two small, rounded and close together groups between and behind the choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus distinct; loreal somewhat sloping, concave; tympanum small, ½ the eye diameter, with a distinct supratympanic fold; first finger shorter than second; disks well developed; a small tubercle at the heel; outer metatarsal tubercle indistinct, inner more prominent, elongated; heel of the adpressed hind limb extends to the middle of the eye. Above, smooth; flanks and posterior part of the eyelids with small, scattered granules. Below, smooth on the anterior part of the chest and throat; belly and thighs granular.

Color. Above, tan; a black canthal streak continues posteriorly over the tympanum and forms a broad lateral band that extends to the groins; limbs crossbarred; posterior aspect of the thighs dark brown. Chest and belly white, immaculate or slightly reticulated.

Measurements. Snout-vent 34.9; head length 11.9; head breadth 12.5; femur 16.5; tibia 18.9.

Remarks. The name *E. bicumulus* has been applied to a number of forms but cotypes reveal a well characterized animal not too easily confused with any of the other Coastal Range forms. In general physiognomy, *E. bicumulus* looks somewhat like *E. urichi* but it is apparently a larger species and has the lateral band that immediately separates it from *urichi.* Some specimens of *E. güntheri* and *E. orocostalis* also show lateral bands. The first is a southern species with small disks not much broader than the phalanges, while *E. orocostalis* is a very small form with short snout and usually tubercular dorsum.

Through the courtesy of Dr. Charles Walker and Dr. Frederick Test, I have been able to examine three specimens of *E. bicumulus* collected by the latter in Venezuela. As these may be used for a separate report by Dr. Test they are not included here, but it may be well to point out that they agree in most essentials with the cotypes, the lateral band occurring in all specimens in greater or lesser degree of intensity. In the younger examples, the snout seems to be longer and the loreal region more vertical, resembling the condition in *E. terraebolivaris.* They can be distinguished, however, by the shorter hind limbs, presence of the lateral band and absence of scapular spots.

ELEUTHERODACTYLUS WILLIAMSI sp. n.

Figure 5

Type. Universidad Central de Venezuela No. 2012, a ♀ from El Junquito, D. F. Coll. Roze, 16 October 1949.

Diagnosis. A small *Eleutherodactylus* with short, transverse vomerine teeth slightly behind the choanae; tympanum ⅓ the eye diameter; a row of tubercles between elbow and wrist; first finger shorter than second; heel of the adpressed hind limb extending to nostril; tubercular dorsum, granular belly and a white (pink or red?) spot in the axilla.

Description. Snout subovoid; tongue oval, free and slightly nicked behind; vomerine odontoids in two short, transverse groups slightly behind the choanae; eye diameter little shorter than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus distinct, curved; loreal slightly oblique, concave; tympanum small, ⅓ the eye diameter; a slight supratympanic fold; two small tubercles between tympanum and arm; a row of small tubercles between elbow and wrist; metacarpal tubercles indistinct; subarticular

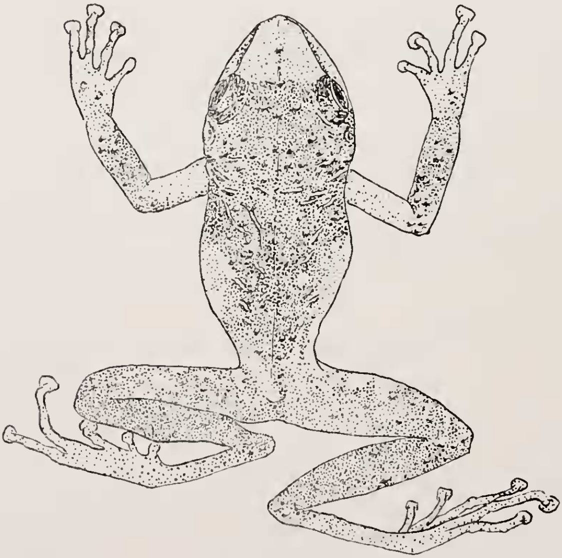

Fig. 5. *Eleutherodactylus williamsi* sp. n. Type U.C.V. 2012.

tubercles rounded, not very prominent; first finger shorter than second; disks fan-shaped, the largest more or less as large as the tympanum; a small tubercle at the heel; metatarsal tubercles very small; heel of the adpressed hind limb extends to nostril. Skin above, mostly smooth on the head, densely tubercular on the body and sparsely tubercular on the limbs; some tubercles fuse and form long ridges on the sides of the dorsum; a row of three small tubercles on the head between occiput and tip of the snout; upper eyelid slightly tubercular; flanks tubercular above, granular below. Belly granular.

Color. Snout dark chestnut; body behind a narrow, light, interorbital line very dark brown; a white (pink or red?) spot in the axilla and in the inner angle of the elbow; rest of the humeral segment light brown; a broad, dark band around the radio-ulnar segment; an extensive, but not well delimited, white, inguinal spot; anterior part of the thighs with a few light spots, posterior part brown with obscure light spots above and a few dark indistinct ones below; rest of the hind limbs uniform dark brown. Below, dusted or speckled with brown.

Measurements. ♀ Snout-vent 23; head breadth 9.5; head length 9; femur 12; tibia 13.

Remarks. Eleutherodactylus williamsi is quite distinct from everything known from Venezuela and can be distinguished from other species by its tubercular dorsal surface and very typical coloration.

ELEUTHERODACTYLUS ROZEI sp. n.

Figure 6

Type. Universidad Central de Venezuela No. 2018, a ♂ ? from Curucuruma, Edo. Aragua. Coll. Roze, 22 March 1951.

Diagnosis. A small *Eleutherodactylus* with rounded, transverse vomerine teeth slightly behind the choanae; eye diameter greater than distance between eye and nostril; tympanum ⅓ the eye diameter; a row of three indistinct tubercles between elbow and wrist; first finger shorter than second; granular belly; distinctly crossbarred limbs and brownish orange regions on the anterior and posterior aspect of the thighs.

Description. Snout short, subovoid; tongue oval, free and slightly emarginate behind; vomerine odontoids in two round, transverse groups behind the choanae; eyes large, their diameter slightly greater than distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus very distinct, curved; loreal scarcely oblique, slightly concave; tympanum small, ⅓ the eye diameter; a slight supratympanic fold from posterior corner of the eye to shoulder; two small tubercles between tympanum and arm; a row of three small tubercles between elbow and wrist; metacarpal tubercles very small and indistinct; subarticular tubercles small and indistinct; first finger shorter than second; disks large, fan-shaped, the largest more or less equal to the tympanum; a small tubercle at the heel; metatarsal tubercles minute; heel of the adpressed hind limb extends to between eye and nostril. Skin above, with scattered small tubercles; a small, flat tubercle on each upper eyelid; flanks tubercular. Belly finely granular.

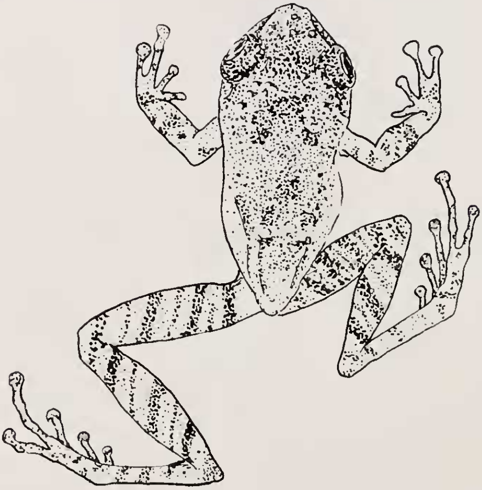

Fig. 6. *Eleutherodactylus rozei* sp. n. Type U.C.V. 2018.

Color. Above, gray with an indistinct bar between the eyes and a large W-shaped marking on the occipital region; a diffuse, dark spot in front of the sacrum; a black canthal and a supratympanic streak; several distinct, black bars radiating from lower eyelid to upper lip; posterior part of the flank and groin with an orange brown spot that extends along the anterior part of the thighs to the knees; buttocks with several wavy lines and round spots; rest of the thighs orange brown on the posterior part; fore and hind limbs distinctly crossbarred with black; ventral surfaces speckled with brown; outer edge of tarsus and fifth toe with a light line.

Measurements. ♂ snout-vent 20; head breadth 7.5; head length 7.5; femur 10; tibia 10.5.

Remarks. This species agrees in some respects with *Eleutherodactylus inguinalis* Parker, 1940, from New River, British Guiana, but, as well as I can make out from the description of that species, it differs in several important characters. The head is definitely not depressed as described for *E. inguinalis,* but rather high and with very large, protruding eyes; the largest disks are not more than ⅓ the width of the eye (½ in *inguinalis*); the subarticular tubercles cannot be called prominent and there is no "black bordered inguinal ocellus."

Eleutherodactylus rozei is quite similar to *E. orocostalis,* from which it can be best distinguished by its coloration. In *E. rozei* the markings on the body, especially the thighs, are very distinct and contrasting, while in *E. orocostalis* the dorsal color is usually black or with obscure markings. Besides, the golden brown stains at the proximal anterior and distal posterior portions of the thighs of *E. rozei* are lacking in *E. orocostalis.* The snout of the latter is also more pointed and triangular.

ELEUTHERODACTYLUS URICHI (Boettger)

Hylodes urichi Boettger, 1894, Journ. Trin. Field Nat. Club, *2*: 88: Trinidad.

Eleutherodactylus gollmeri Schmidt, K. P. (not Peters), 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 159.

Eleutherodactylus bicumulus Schmidt, K. P. (not Peters), 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 159.

11 (C.N.H.M. 17777-87) Mt. Turumiquire, 7000-8000 ft., 32.

Description. Snout long, subovoid; tongue usually small, oval or spatulate, free and entire; vomerine odontoids in two very short and slightly oblique groups behind and between the choanae, their posterior extremities converging; interorbital space 1½ to 2 times broader than the narrow upper eyelid; eye diameter equal or slightly shorter than distance between eye and nostril; canthus distinct, usually curved; loreal moderately inclined, almost flat; tympanum small, ⅓ the eye diameter; metacarpal tubercles not very distinct; subarticular tubercles moderate, round; first finger shorter than second and with a much smaller disk; disks moderate, the largest almost as large as the tympanum; metatarsal tubercles small, the other very indistinct; toes free; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth or with a slight tuberculation on the posterior half (♂ ?); usually a small tubercle on the upper eyelid; flanks smooth or granular. Below, smooth on the throat and chest; very distinctly granular on the belly (with occasional exceptions) and finely or more coarsely granular on the thighs.

Color. Above, uniformly golden or purplish brown, very rarely with blotches or large spots; upper eyelids occasionally edged with white; thighs, groin and hidden portions of tibiae reddish. Color of the belly generally purplish between the lighter colored granules; throat and chest dirty white or brownish (reticulated in 17784, which is spotted above).

Measurements. Snout-vent ♂ 29, ♀ 31; head breadth ♂ 10, ♀ 11.5; head length ♂ 9.8, ♀ 11; femur ♂ 13.5, ♀ 13; tibia ♂ 14, ♀ 14.

Range. The eastern section of the Coastal Range. Trinidad and the Guianas.

Remarks. The Venezuelan *E. urichi* differs from topotypical material in its larger size (largest of 10 Trinidad specimens, snout-vent 24 mm.), longer and narrower snout, and in the absence of body markings in most of the specimens. Of 10 Trinidad specimens examined, all have a short, black supratympanic streak, 9 have distinct or indistinct crossbars on the hind limbs, 7 have vertical bars on the upper lip and 8 have some kind of markings above.

Of the 11 Venezuelan examples, only two have a slight supratympanic streak and distinct spotting of the dorsal surfaces. C.N.H.M. 17784 is strikingly different from the other specimens in coloration, but it agrees in most morphological characters.

Although the Venezuelan *E. urichi* probably represents a race, I have preferred to use the binomial until specimens from other northern South American countries have been examined.

ELEUTHERODACTYLUS RETICULATUS Walker and Test

Eleutherodactylus reticulatus Walker and Test, 1955, Occ. Pap. Mus. Zool. Univ. Mich., No. 561: 4: Pico Periquito, Rancho Grande, 1275 m.

1 (U.M.M.Z. 109873, paratype) Rancho Grande, 1090 m., 51.

Description. Head broader than long; snout subovoid; tongue rounded, ⅓ free, slightly nicked behind; vomerine odontoids in two small, round and close together series between and just behind the small choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid;

canthus distinct; loreal moderately oblique, concave; tympanum small, indistinct, ⅓ the eye diameter; a very slight supratympanic fold; two large tubercles at the angle of the jaw; a few very small tubercles at the elbow; one distinct humeral tubercle near the wrist; first finger shorter than second, which is shorter than fourth; an elongated large and a flattened divided outer metacarpal tubercle; disks somewhat indented at their free end, the largest larger than the tympanum; some very small tubercles at the heel; no tarsal fold or tubercle; an oval, rather prominent inner and a smaller, rounded outer metatarsal tubercle; subarticular tubercles rounded, not too prominent; disks of toes smaller than those of the fingers; heel of the adpressed hind limb extends to the tip of the snout. Skin above, smooth, except for an occasional tubercle; one distinct tubercle at each eyelid. Ventral surfaces granular on the throat, belly and posteroventral aspect of thighs.

Color. Above, grayish brown, with two darker blotches at the scapular region, one in the center, anterior to the sacrum, several small spots or dots at the coccygeal region, and other not so well defined mottles or freckles all over the dorsum; no apparent canthal streak; a narrow, not too distinct supratympanic streak; two dark lines radiating from eye to upper lip; anterior to this, another triangular labial spot; a few white, irregular spots at the groin; anterior and posterior aspects of the thighs equally dotted with white, on a chestnut background: rest of the hind limbs with diffuse, dusky crossbars. Below, brownish, reticulated with lighter, the hind limbs being darker and with better defined white dots; a series of white dots along the margin of the lower lip.

Measurements. ♀, snout-vent 35; head length 12.5; head breadth 13.3; femur 18; tibia 19.

Habits. Walker and Test state that some of the specimens were collected during the daytime under leaf litter, while another example was caught at night while sitting on the leaf of a plant at about four feet from the ground.

Range. Only known from the type locality.

Remarks. The tympanum of this species, although clearly evident, is not too distinct, its margins being more or less level with the skin surface.

The type is described as having a tubercular upper surface and a pair of short, crescentic glandular folds in the scapular region. The living coloration is said to be "clay brown, with blackish markings on face, back, and legs; venter purplish black and white."

In general form of head and snout this species agrees with *E. güntheri* and *E. sancta-martae,* which, however, are very different in other respects. *E. fitzingeri* and *E. conspicillatus* which are also spotted on the posterior part of the thighs, have a good-sized, distinct tympanum and a long, subelliptical snout with a strong canthus rostralis.

ELEUTHERODACTYLUS RACENISI sp. n.

Figure 7

Type. Universidad Central de Venezuela No. 2014, a ♀ from El Junquito, D. F. Coll. Roze, 14 April 1951.

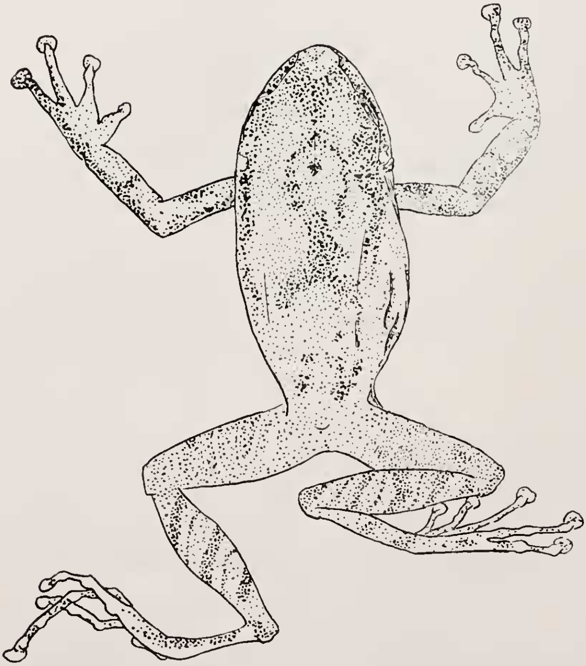

Fig. 7. *Eleutherodactylus racenisi* sp. n. Type U.C.V. 2014.

Diagnosis. A moderate sized *Eleutherodactylus* with oblique, posteriorly converging vomerine teeth situated behind the choanae; tympanum ⅓ the eye diameter; a small tubercle on the distal portion of the radio-ulnar segment; first finger shorter than second; large, fan-shaped disks slightly larger than the tympanum and heel of the adpressed hind limb extending to the eye.

Description. Snout subovoid; tongue oval, slightly nicked and free behind; vomerine odontoids in two oblique, posteriorly converging groups behind the choanae; eye diameter equal to distance between eye and nostril; interorbital space slightly broader than an upper eyelid; canthus moderate, curved; loreal oblique, concave; tympanum ⅓ the eye diameter; two small tubercles at the angle of the mouth; a flat, indistinct supratympanic fold; a small tubercle on the distal portion of the radio-ulnar segment and one or two less distinct ones between this and the elbow; metacarpal tubercles indistinct; subarticular tubercles moderate, not very prominent; first finger shorter than second; disks large, fan-shaped; the largest slightly larger than the tympanum; a small tubercle at the heel; an oval, not very distinct, inner and a small, rounded, outer metatarsal tubercle; toes free; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth, slightly tubercular in front and behind the tympanum; a transverse fold on each upper eyelid. Below, smooth.

Color. Above, brown with chocolate brown markings of irregular form; one marking forms a canthal streak, one crosses the intercanthal space in front of the eyes while others form a posteriorly diffuse spot between the eyes; a pagoda-shaped marking in front of the sacrum; a diffuse but extensive temporal spot that extends back on the flanks and a few radiating bars between lower eyelid and upper lip; anterodorsal part of the thighs with a row of rounded, white (pink or red?) spots from base to knee (in left thigh the spots are confluent and not well defined); upper part of the thighs with indistinct dark and light bars; posterior aspect uniform brown; forelimbs and rest of hindlimbs crossbarred. Ventral surfaces dusted with brown, the throat more profusely so than the rest of the body; tibial segment with a large, white (pink or red?) spot; tarsus dark brown; metatarsus wtih a light outer line that extends to the disk of the last toe.

Measurements. ♀ Snout-vent 36; head breadth 13; head length 12; femur 14.5; tibia 16.

Remarks. Eleutherodactylus racenisi is somewhat similar in coloration to *E. briceni* but it differs from this species in having a narrower head, no elevation of the frontoparietals, slightly smaller tympanum, and in other characters. It also bears some superficial resemblance to *E. megalops* of the Sta. Marta region of Colombia, and *E. reticulatus* of the Coastal Range of Venezuela. It can be distinguished from both by the smooth dorsum and venter, shorter hind limbs, different color of the thighs, and different position of the vomerine odontoids.

ELEUTHERODACTYLUS MARMORATUS (Boulenger)

Hylodes marmoratus Boulenger, 1900, Trans. Linn. Soc. London, *8*: 56, pl. V, fig. 6: Mt. Roraima, 3500 ft.

5 (U.P.R. 214-18) Mt. Marahuaca, 4,050 ft., v.50.

Description. Snout short, subovoid to subelliptical; tongue oval, free and slightly nicked behind; vomerine odontoids forming two short, slightly oblique groups behind and between the round choanae, their posterior extremities directed inwards; interorbital space broader than an upper eyelid; eye diameter as long as distance between eye and nostril; canthus distinct; loreal almost straight, concave; tympanum small, not more than ⅓ the eye diameter; metacarpal tubercles slight, subarticular tubercles rounded, moderate; fingers free, the first shorter than second; disks truncate, of about the same size as the tympanum; metatarsal tubercles small, the inner a little more oval than the outer; toes free; heel of the adpressed hind limb extends to between eye and nostril. Skin above generally sparsely tubercular; loreal region granular; flanks, belly and ventral surface of the thighs granular; a transverse pectoral fold. Male with a large, subgular vocal sac.

Color. Above, brownish gray with darker, sometimes obscure spots; upper eyelids dark; a black supratympanic streak; two black, curved, longitudinal lines from near the upper eyelid toward the scapular region; a few, sometimes indistinct bars radiate from eye to upper lip; hind limbs crossbarred; ventral surfaces white or greenish white, immaculate.

Measurements. Snout-vent ♂ 17.5, ♀ 22; head breadth ♂ 6, ♀ 8; head length ♂ 6.2, ♀ 7.9; femur ♂ 7.7, ♀ 10.1; tibia ♂ 9, ♀ 11.

Habits. Collected at night in shrubs and small trees where their voices were heard but could not be recorded.

Remarks. Two of the three male specimens are longitudinally striped with brown, but they were taken in the same place, and morphologically they agree with the other three examples.

The non-striped male was sent to Dr. Parker for comparison with the type. He pronounced it conspecific with the Roraima form.

See remarks under *Otophryne robusta.*

ELEUTHERODACTYLUS ANOTIS Walker and Test

Eleutherodactylus anotis Walker and Test, 1955, Occ. Pap. Mus. Zool. Univ. Mich. No. 561: 7: Rancho Grande, 1090 m.

1 (U.M.M.Z. 109877, paratype) Rancho Grande, 1090 m., 51.

Description. Head broader than long; snout subovoid; tongue rounded, ⅓ free, indistinctly nicked behind; vomerine odontoids round, transverse, close together and immediately behind the small choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus rostralis distinct; loreal region little oblique, concave above; tympanum completely hidden; a slight fold above its site; a few tubercles at the elbow and three or four very indistinct ones along the posterior side of the arm; a palmar and an inner metacarpal tubercle; subarticular tubercles rounded, not very protuberant; first finger shorter than second, which is shorter than fourth; disks moderate; a few slight tubercles at the heel; no tarsal fold; inner metatarsal tubercle elongated, outer rounded, conical; toes free, their disks smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above, rugose and tubercular, especially behind the angle of the jaw, in the temporal region and anterior, upper flanks; a few tubercles at the upper eyelid; some tubercles elongate and form a rough W-shaped figure behind the nape. Below, with slight granulation on the venter and posteroventral aspect of the thighs.

Color. Above, grayish brown, with irregular mottling and dusting, lighter on the snout, in front of a narrow, posteriorly diffused interorbital line; loreal region with dark brown bars that radiate from eye to upper lip; anterior and posterior aspect of the thighs uniform, with some infuscation; limbs crossbarred. Below, brownish white, with greater infuscation on the limbs, throat and anterior belly, where light points and reticulations can be seen; a series of white dots margin the lower jaw.

Measurements. ♀ Snout-vent 41; head length 15; head breadth 16; femur 20.5; tibia 23.5.

Habits. During the day *E. anotis* hides in rock crevices and at night comes out and is found on rock outcroppings in or near streams (Walker and Test, *op. cit.*).

Range. Known only from within 1 km. of the type locality and from a stream beside the Maracay-Charoni road, at 1300 m.

Remarks. According to Walker and Test, there seems to be little structural variation in the species. The head in the larger individuals is broader than in the smaller ones and the heel may reach to the tip of the snout. A narrow dorsolateral fold that extends from above the shoulder halfway to the groin is described for the type but is not evident in paratype U.M.M.Z. 109877. Neither is an ill-defined femoral ocellus or a distinct dorsal triangular blotch. One of the immature specimens available to Walker and Test had a broad, light, vertebral stripe.

The coloration of the living animal is described as follows: dorsal surfaces greenish to olive, sometimes overlaid with reddish cinnamon, or with scattered, pale gray flecks; posterior part of the belly and underside of the thighs and shanks reddish, coral red or brownish salmon.

Other large *Eleutherodactylus* without tympanum are *E. ventrivittatus* Andersson,[1] *E. surdus* (Boulenger) and *E. roseus* (Boulenger).

E. ventrivittatus is distinctly marbled below and has white and black thigh bars; *E. surdus* (from W. Ecuador) has a smooth skin, chevron-shaped markings on the back and white spots on the posterior aspect of the thighs, while *E. roseus* has a very oblique loreal region, smooth dorsal skin, a white streak on the canthus and edge of the upper eyelid and pink spots on upper eyelids and flanks. *E. whymperi* (Boulenger) does not have a tympanum but it is a relatively small, compact and rotund form with no similarity to *E. anotis.* Lutz and Kloss described *E. carvalhoi* from the Alto Solimoes, Amazonas, apparently from immature specimens without exposed tympanum. This species has a vertical loreal region and a light spot on each flank, at the lumbar area.

Included under this species are U.C.V. 44, from El Junquito, and U.C.V. 2008-9 from La Culebra, Edo. Miranda. These specimens have a small, indistinct tympanum, but this may be a sign of immaturity in this species, as all three examples agree with adult *E. anotis* in other important morphological characters, and in some details of their distinct coloration.

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[1] Perhaps a synonym of *E. ventrimarmoratus* (Boulenger), although this species is described as having a small tympanum. M.C.Z. 19643-7 and 24437 are probably referable to this species, although determined as *E. latidiscus.* The smaller specimens of these do not have any apparent tympanum, are very tubercular above, have comparatively smaller disks and show a uniform ventral surface.

U.C.V. 44 is only 9 mm. long. The color above is greenish gray, with a dark green spot on the middle of the body, in front of the sacrum; the loreal region and tip of the snout are coral red; the limbs, coral red, crossbarred with dark grayish green; there is a whitish area at the knee, and the ventral surfaces are much infuscated on the throat and anterior part of the belly. In coloration, this little frog looks more like a gaudy, coral reef crab than an *Eleutherodactylus*.

U.C.V. 2009 is reddish or brownish gray with darker mottlings on the upper flanks and dorsolateral region, and it has a greenish, well defined interscapular spot and another spot of the same color on the middle of the sacral region; the venter is salmon red. In No. 2008 the general dorsal color is gray with irregular spots of different shades of gray and a light green interorbital spot; the hind limbs are crossbarred except for the distal portions of the tibiae, which are of a contrasting milky white color; the distal portion of the femur and proximal part of the tibia is blackish; the distal portion of the tibia and most of the tarsus, white. The peculiar coloration of these small frogs make them look as if they were covered with lichens.

Key to the Species of CERATOPHRYS *Recorded from Venezuela*

I. Toes ⅓ webbed; heel of the adpressed hind limb extends to the tympanum; inner metatarsal tubercle shovel-shaped, with a sharp edge; no orange or red on the back .... *calcarata*

II. Toes ⅔ webbed; heel of the adpressed hind limb extends to between eye and nostril; inner metatarsal tubercle oval, blunt; orange and red on the back .... *cornuta*

CERATOPHRYS CALCARATA Boulenger

Ceratophrys calcarata Boulenger, 1890, Proc. Zool. Soc. London: 327, pl. xxvi: Colombia.

1 (U.P.R. 196) Territorio Amazonas, i.48.
1 (U.P.R. 197) Pto. Ayacucho, vi.50.

Description. Head much broader than long, bony and very high; snout short and rounded; tongue rounded, slightly emarginate and free behind; "vomerine odontoids" present as small patches in front of the large, transverse choanae of the male, absent in the female; eye diameter a little shorter than distance between eye and nostril; nostril closer to the eye than to the tip of the snout; a longitudinal frontal furrow; interorbital space concave, as broad as an upper eyelid; a triangular dermal appendage and several other smaller papillae on the upper eyelid; canthus descending almost vertically to the tip of the snout; loreal slightly sloping; tympanum not very distinct, rather more than ½ the eye diameter; a flat and broad, bony supratympanic ridge; a slight glandular ridge along the forearm; a large but somewhat diffuse outer and a smaller oval inner metacarpal tubercle; fingers free, the first stronger and longer than second; last finger scarcely extending to the penultimate articulation of the longest third; a distinct tarsal fold; a horny spade-like, inner metatarsal tubercle, the outer absent or indistinct; subarticular tubercles of toes moderate, smaller than those of the fingers; toes about ⅓ webbed; heel of the adpressed hind limb extends to the tympanum. Skin above, rugose and warty, the larger warts with longitudinal ridges; flanks and ventral surface of the body and thighs granular.

Color. Above greenish gray or whitish with olive green markings; a dark green, usually T-shaped spot in the frontal furrow; several radiating bars from eye to upper lip; two light-colored broad lines originate on the eyelid appendages, meet in front of the occipital region and continue posteriorly to the anus, sending ramifications between the darker spots of the body; in the sacral region this stripe is usually divided by an oval, central spot; a pair of externally concave, reniform spots between the supraorbital ridges and the central longitudinal stripe; limbs crossbarred. Ventral surfaces yellow white, with brown variegations; lower lip with a series of dark, elongated spots that usually extend to the region of the anterior girdle.

Measurements. ♀ Snout-vent 79; head breadth 45; head length 31; femur 27; tibia 22.

Habits. While in San Fernando de Atabapo I heard of a woman in Puerto Ayacucho who had been bitten by a poisonous toad when she went out at night to get a chicken in her yard. Upon returning to Puerto Ayacucho a reward was offered for the "poisonous toad" and when a man appeared with a "sapo de cachos" tied to a string, the animal was shown to Justina Manrique for identification. That was, in effect, the supposed poisonous animal, but since the small teeth failed to penetrate the skin of my finger, she insisted that the toad loses its poisonous properties when kept in captivity. The animal was always aggressive and held on to a stick with the tenacity of a bulldog. Justina still showed a pair of punctures on the ankle and it might be supposed that she was the victim of a poisonous snake which was approaching the toad. On being questioned if she knew the toad to be poisonous she answered that she had heard of a poisonous ''sapo'' with ''horns'' but had never seen one before. The doctor who was said to have attended her and who ''gave her some shots'' could not be found.

The other ♀ specimen (U.P.R. 196) was obtained through the courtesy of Dr. Hans Baumgardner of Puerto Ayacucho, who said that the toad was common in ditches and on a nearby granite hill, where, after rain, water accumulated in depressions. Although a whole night was spent searching for them, no *Ceratophrys* could be found on this hill nor in any other place in Puerto Ayacucho.

Range. The Venezuelan Guayana and probably the Llanos, the coastal belt, the Falcón Region and the lower Maracaibo Basin, northeastern Colombia and perhaps the southern Guianas and the savannas of N. Brasil. The presence of this species in Santa Marta region of Colombia and in Puerto Ayacucho may indicate that it is also found in the Llanos and in the arid and semiarid regions of N. Venezuela. It is not known by the people of San Fernando de Atabapo, an indication that its distribution is affected by the higher humidity and other ecological factors of this region.

Remarks. Adolpho Lutz, (1927: 40) records seeing a *Ceratophrys* from Venezuela but failed to obtain specimens and was uncertain whether the frog was a *calcarata* or *cornuta.* It might well have been an *Eleutherodactylus cornutus maussi.*

The Venezuelan animals seem to have a higher head and a shorter and more rounded snout than the specimens from northeastern Colombia. A male of this latter group has the following measurements: snout-vent 72; head breadth 45; head length 33; femur 24.3; tibia 23. A vocal sac is present and is generally dark in color.

No vomerine teeth have been detected between the choanae but the male toads from Colombia have two whitish patches far in front of the openings. These are well raised and represent protuberances of some bone, but as the head of this form is so much compressed from back to front, it is possible that the cranial bones are equally modified or moved and these odontoids may actually come from the vomer, although their position is closer to that of the premaxillary of normal forms. The matter is under investigation.

CERATOPHRYS CORNUTA (Linné)

Rana cornuta Linné, 1758, Syst. Nat., ed. 10: 212: Virginia (in error).
Ceratophrys cornuta Ernst, A., 1877, Flora y Fauna de Ven.: 281; Röhl, E., 1949, Fauna Descr. de Ven., ed. 2: 406, fig. 185.

No material examined.

Original Description. (Based on Seba *1*, pl. LXXII, figs. 1, 2.) Eyelid conical; aspect horrible.

Color. According to Röhl: above green, brown and black, with an orange stripe that extends from the head to the end of the dorsum; shoulders reddish green; hind limbs green, streaked with lighter green. Jiménez de la Espada (1875: 32) speaks of an irregular mixture of orange, red, purple and dark chestnut spots on the dorsum, with emerald green and purple bars alternating on the sides of the head and limbs (*C. megastoma*).

Range. ?Venezuela. Surinam, Brasil, Bolivia, Ecuador.

Remarks. There is no doubt that the color description given by Röhl is not that of *Ceratophrys calcarata* nor of *Eleutherodactylus cornutus maussi*, the other species with which it could be confused. I feel, however, very uncertain about the identity of this animal and about its presence in Venezuela. The A.M.N.H. has British Guiana specimens under this name (not examined) and its occurrence in this country has been confirmed by Crawford (1931: 11).

Like Boulenger (1882), Crawford speaks only of a grayish color, the head and back with dark markings and the flanks marbled with brown. I believe *C. calcarata* may extend to British Guiana, and it is not improbable that these records may refer to that species and not to *C. cornuta.*

According to Röhl the common name for this species in Venezuela is "rana cornuda."

PSEUDOPALUDICOLA PUSILLA (Ruthven)

Paludicola pusilla Ruthven, 1916, Occ. Papers Mus. Zool. Univ. Mich., No. 30: 1-3: Fundación, Colombia.
Paludicola exigua Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

12 (U.P.R. 237-45, 247-9) Pto. Ayacucho, vi.50.
2 (U.P.R. 252, 254) Pto. Ayacucho, vi.50.

Description. Snout subovoid or subelliptical; tongue narrow, somewhat pyriform, entire and free behind; eye diameter greater than distance between eye and nostril but shorter than the snout; interorbital space equal to, or a little broader than an upper eyelid; canthus rounded; loreal oblique, concave; tympanum hidden;

one distinct and one or two other less prominent tubercles between elbow and wrist; subarticular tubercles large, rounded, that of the inner finger much larger than the others; fingers free, first shorter than second; tips of fingers swollen; usually a tubercle at the heel; an oblique tarsal fold that commences with a tubercle at the middle of the tarsus; metatarsal tubercles small but very prominent, the outer commonly pointed; subarticular tubercles of toes prominent; toes with a short web that extends to the small disks as distinct lateral fringes; heel of the adpressed hind limb extends to the middle or anterior corner of the eye. Skin above, generally rugose and warty (apparently smooth in females); a flat, oblique and indistinct fold from lower eyelid to base of the humerus. Below, smooth. Male with two slight subgular vocal sacs.

Color. Above, brown or dark grayish-brown, generally with darker spots or large yellowish blotches that may cover most of the dorsum; an occasional specimen with a greenish yellow vertebral stripe; upper lip vertically spotted with white; a dark longitudinal line along the posteroventral part of the thighs. Below, white, immaculate or speckled with brown, especially on the throat and limbs.

Measurements. Snout-vent ♂ 12, ♀ 17; head breadth ♂ 4.6, ♀ 5; head length ♂ 4.9, ♀ 6; femur ♂ 5.5, ♀ 7; tibia ♂ 5.7, ♀ 7.

Habits. All the 12 males were caught on the sandy shores of a stream. There was small and sparse forest growth on the margins, deep forest upstream, and savannas nearby. The two gravid females were found in a grassy savanna near a large granite outcropping. For a good illustration of the habitat of this animal and probably the exact location where the two females were collected, the reader is referred to Hitchcock (1947, fig. 13).

The tremendous jumps that this little animal is capable of performing make it extremely difficult to catch. Sometimes on opening one's hand expecting to see the frog, one finds only dust and leaves, for the little animal is jumping several feet away.

Additional Localities. Pto. Ayacucho nr. Venado (U.S.N.M. 80674); nr. Rosario (U.S.N.M. 115760-7); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana (lower extension of the Llanos into Pto. Ayacucho), the arid and semiarid Maracaibo Basin and probably the Llanos, the Falcón Region and the coastal belt. Northeastern Colombia across central and southern

Venezuela to British Guiana. It probably occurs also in the Llanos of Colombia, the savanna country of the eastern Guiana and in N. Brasil.

Remarks. The two females from Pto. Ayacucho have a more pointed and longer snout than the males, and since both of them are full of eggs, the heel scarcely reaches the shoulder.

Very little difference has been found between this species from southern Venezuela and a paratype from Colombia. There is only one tubercle on the forearm of the latter.

Six specimens from Inírida in the Senckenberg Museum (*Paludicola exigua* Boettger, 1896) were found to represent this species.

PALUDICOLA FISCHERI Boulenger

Paludicola fischeri Boulenger, 1890, Proc. Zool. Soc. London: 327, pl. xxv, fig. 2: Venezuela; Nieden, 1923, Das Tierreich. Anura I: 512.

Paludicola Fischeri Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 46.

No material examined.

Description. Parker (1927:473) has placed *Paludicola fischeri* under the synonymy of *Physalaemus gracilis* Blgr., stating that he has been unable to find any character by which to distinguish the two species or any data to confirm the locality. Since *Physalaemus gracilis* is a southern form not likely to occur in Venezuela, it should not be included for the present in the fauna of this country. *A Physalaemus*[1] has been taken by Dunn at Villavicencio and Llanos de Boyacá of Colombia (1944a: 512). Probably this form will also be found in Venezuela.

PLEURODEMA BRACHYOPS (Cope)

Pleurodema bibroni var. B. Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 32.

Lystris brachyops Cope, 1868, Proc. Acad. Nat. Sci. Phila.: 312: Magdalena R., Colombia.

Pleurodema Sachsi Peters, 1877, Monatsb. Berl. Akad. Wissensch.: 460.

Paludicola brachyops Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 232; Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40.

Pleurodema brachyops Nieden, 1923, Das Tierreich, Anura, I: 499; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 46, pl. 11, fig. 17; Parker, 1927, Ann. Mag. Nat. Hist., (9) *20*: 473; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160.

2 (U.S.N.M. 115757-8) Campo del Lago, Lagunillas, iv.42.

1 (U.S.N.M. 36371) Chicara (Caicara?), 05.

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[1] I have been unable to find to what species Dunn referred.

5 (U.S.N.M. 117525, 128841-4) Sierra de Sta. Ana, Falcón, 39.
1 (U.S.N.M. 128840) Palenque, iii.39.

Description. Snout short and rounded; nostrils closer to the tip of the snout than to the eye; tongue oval, entire or indistinctly nicked behind; vomerine odontoids in two short, oblique groups between the choanae, their posterior extremities directed inwards; eye diameter as long as the snout; interorbital space equal or narrower than an upper eyelid; canthus rounded; loreal almost vertical, not concave; tympanum not very distinct, about ½ the eye diameter; metacarpal tubercles oval, distinct; fingers free, the first a little longer than second which may be slightly longer than fourth; subarticular tubercles of fingers and toes very prominent; tips of fingers swollen; two sharp, inwardly directed, shovel-shaped, metatarsal tubercles; toes with a slight web that extends to the tips as thick lateral fringes; heel of the adpressed hind limb extends to the shoulder. Skin above, with scattered small warts and short glandular ridges; two prominent and relatively large lumbar glands. Below, smooth. Male with a subgular vocal sac.

Color. Above, light yellowish brown or gray, marbled and spotted with darker brown; a dark spot under the eye; sometimes a vertebral stripe; lumbar glands blackish brown, spotted with pink (red?); inguinal region, underside of the tibiae and a transverse spot at the knee, pink.

Measurements. Snout-vent ♂ 31.5, ♀ 34.5; head breadth ♂ 13, ♀ 13.5; head length ♂ 10.5, ♀ 10.5; femur ♂ 12, ♀ 11; tibia ♂ 12.5, ♀ 13.

Additional Localities. Caracas (Boettger, 1892); Cocollar (C.N.H.M. 17783 [=Schmidt, 1932]); Distrito Acosta (C.N.H.M. 25898); Maracay (Lutz, 1927); Sn. Fdo. de Apure (Peters, 1877); Venezuela (U.S.N.M. 36372-5; Günther, 1858; Boulenger, 1882; Boettger, 1893; Nieden, 1923).

Range. The arid and semiarid Maracaibo Basin, the coastal belt, the Coastal Range and the Llanos. Northeastern Colombia and the islands north of Venezuela to British Guiana and northern Brasil. Dunn (1944) says it also occurs in Panamá.

Remarks. There seems to be considerable variation in the coloration of this form. Some have a canthal streak, others vertical spots on the upper lip, a vertebral stripe or black color extending outside of the lumbar gland. In the specimen from Cocollar there are a very few light spots in these glands. I failed to detect vomerine teeth in U.S.N.M. 115758.

EUPEMPHIX PUSTULOSUS RUTHVENI Netting

Engystomops pustulosus Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 33.

Eupemphix pustulosus Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40; Alemán, 1952, Mem. Soc. Cienc. Nat. La Salle, *12*: 26, fig. 6.

Eupemphix pustulosa Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42, pl. xii, figs. 25, 26.

Eupemphix ruthveni Netting, 1930, Ann. Carneg. Mus., *19*: 167, pl. vii, fig. 1: Fundación, Colombia.

1 (U.M.M.Z. 55555) La Fría, Pueblo Nuevo.
1 (U.M.M.Z. 57398) Sta. Elena, Mérida.

Description. Snout triangular; tongue small, narrow, entire and free behind; choanae small, round; eye diameter more or less equal to distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; tympanum very indistinct, almost hidden; parotid triangular, mostly lateral and not very distinct; canthus angular; loreal vertical, not concave; subarticular tubercles quite distinct and prominent; fingers free, the first slightly shorter than second; fingers and toes distally swollen; a conical tubercle on the middle of the tarsus; metatarsal tubercles moderate, sometimes pointed; toes practically free; heel of the adpressed hind limb extends to the eye. Skin above, covered with round and elongated warts; a small lateral gland on each side between axilla and groin. Belly slightly granular. Male with a large subgular vocal sac.

Color. Above, brown or dull, dark gray with obscure darker markings that occasionally follow some of the rows of warts; a short, greenish-yellow vertebral stripe from tip of urostyle to sacrum or slightly beyond; limbs spotted or crossbarred. Throat, chest and anterior part of the belly infuscate, with a median greenish-yellow line that extends to the light-colored hinder portion of the belly; this is marked with distinct round spots. The ventral surface of the hind limbs may be slightly spotted.

Measurements. Snout-vent ♂ 25, ♀ 28.5; head breadth ♂ 8, ♀ 9; head length ♂ 7, ♀ 7.5; femur ♂ 10, ♀ 11; tibia ♂ 11, ♀ 11.5.

Additional Localities. Caracas (Boettger, 1892); Caripito (U.S.N.M. 11792-7); El Sombrero (U.C.V. 34); Espino (U.C.V. 67); Maracay (Lutz, 1927); Ocumare del Tuy (U.C.V. 7-8); Pie del Cerro (U.S.N.M. 121149); Puerto Cabello (Boettger, 1893); Sta. Lucía (U.S.N.M. 121150-1); Turgua (Alemán, 1952).

Remarks. In ventral coloration the two specimens from Maracaibo Basin are somewhat intermediate between the typical form and the animal that occurs in central and eastern Venezuela. The latter are usually smaller and their bellies uniformly colored behind. I am uncertain whether the Venezuelan form deserves to be separated from *E. p. trinitatis,* but Netting has examined quite a number of specimens and insists on their distinctness. Probably the Trinidad frogs are not more divergent from the animals of eastern Venezuela than these are from those of the west.

The male specimen measured (U.C.V. 34) is not one of the two specimens on which the description was based. Except for the darker color of the external vocal sac, this animal is plain below. It does not have ventral or vertebral stripes. In some examples the venter is smooth while in those from north central Venezuela the dorsal stripe does not reach the sacrum and may be very short or even absent.

PSEUDIDAE

Pseudis paradoxus (Linné)

Rana paradoxa Linné, 1758, Syst. Nat., ed. 10: 212: Surinam.

Pseudis paradoxa Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44, pl. xi, figs. 18, 19.

No material from Venezuela.

1 (M.C.Z. 2557) British Guiana.

2 (M.C.Z. 12135-6) Coast Lands, Demerara, British Guiana.

Description. Head flat, much broader than long; snout short, rounded to subovoid; tongue broad, rounded, entire or slightly nicked and free behind; vomerine odontoids in two prominent transverse groups between the small choanae; eyes small, their diameter equal to distance between eye and nostril; interorbital space at least twice as broad as the narrow upper eyelid; tympanum not very distinct, ¾ or more of the eye diameter; canthus flat and indistinct; loreal sloping, concave; no prominent supratympanic fold; a row of small tubercles along the forearm; fingers free, the first opposed to the others; subarticular tubercles of the fingers small, but larger and more distinct than those of the toes; a prominent tarsal fold; a very prominent, almost spurlike (not cornified), inner metatarsal tubercle, the outer absent or indistinct; toes broadly webbed to the tips; tips of fingers and toes slightly expanded; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with some glandules on the flanks. Below, smooth, including the thighs; a distinct fold at the knee and another at the heel.

Color. Above, yellowish brown or dark brown with peculiar elongated spots and occasionally minute points; limbs with large dark spots; flanks and posterior part of the thighs with yellow spots. Below, yellow, with scattered, small, brown spots on the belly and larger more elongate ones on the throat and chest; an oblique, long, brown line or spot on each side of the breast; thighs with pretty, longitudinal spots; tibiae and tarsi marbled; two innermost toes usually yellow.

Measurements. Snout-vent ♂ 57, ♀ 66; head breadth ♂ 20, ♀ 24; head length ♂ 18, ♀ 19; femur ♂ 31, ♀ 35; tibia, ♂ 32, ♀ 36.

Habits. According to Lutz, these frogs "rarely come out of the water where they are not easily caught, though they can be taken by angling. The call of *P. paradoxus* is a characteristic croak."

Additional Localities. Maracay (Lutz, 1927). According to Ditmars (*The Making of a Scientist,* 1938: 245) tadpoles of this species were discovered in "certain lakes of Venezuela." I have not found any reference to this collection, but Savage and Carvalho (1953: 195) mention eastern Venezuela as part of the range of the species.

Range. Maracay and E. Venezuela. Trinidad and the Guianas, south to Paraguay and Argentina.

Remarks. The genus *Pseudis* was originally included in the Leptodactylidae. In 1935 Parker suggested that, on account of its possessing an extra phalanx in each digit (which may be an enlarged intercalary phalanx), *Pseudis* should probably be included in the Hylidae. In a recent paper, Savage and Carvalho (1953) have erected a new family for those frogs with an extra phalanx in their digits.

HYLIDAE

Key to the Genera of Venezuelan Hylidae

I. Pupil horizontal; toes webbed.
   A. Female with a dorsal pouch in which the eggs are carried, derm of head involved in cranial ossification or, if not, first finger equal or longer than second.
      1. Size small (25 mm.); dorsal pouch opening by a longitudinal slit; fingers free; first finger longer than second . . . . *Nototheca*

    2. Size large (50 mm.); dorsal pouch opening by two longitudinal or crescent shaped slits on the posterior half of the dorsum; fingers webbed . . . . *Gastrotheca*
  B. Female without a dorsal pouch; first finger shorter than second (except in *Hyla marahuaquensis*).
    1. Derm of head involved in cranial ossification . . . . *Corythomantis*
    2. Derm of head free . . . . *Hyla*
II. Pupil vertical . . . . *Phyllomedusa*

Key to the Species of HYLA *Reported from Venezuela*

I. Choanae large, vomerine odontoids in two groups forming together a /‾ ‾\ or a / \.[1]
  A. Outer finger with not more than 2 free phalanges.
    1. An external rudiment of pollex.
      a. Outer finger fully webbed (1 phalanx = disk free); tympanum ⅔ the eye diameter; heel to between eye and nostril or tip of the snout; brown above; a row of dark spots along the flanks; 75 mm. . . . . *boans*
      b. Outer finger with 1½ free phalanges; tympanum ⅔ the eye diameter; heel to the tip of the snout; purple brown with dark scribblings above; lower eyelid with metallic venation; bones green; 75 mm. . . . . *wavrini*
      c. Outer finger with 2 free phalanges; tympanum ½ the eye diameter; heel to tip of the snout or beyond; a pair of dorsolateral folds from eyes to groin; apple green (when alive) or closely dotted with brown (preserved) above; 50 mm. . . . . *albomarginata*
      d. Outer finger with 2 free phalanges; tympanum ½ the eye diameter; heel to anterior corner of the eye or between eye and nostril but not beyond; no dorsolateral folds; green (when alive) occasionally with peculiar brown spots or yellowish white (preserved) above; 40 mm. . . . . *granosa*
    2. No distinct rudiment of pollex.
      a. Outer finger with 1½ to 2 free phalanges; tympanum ⅔ the eye diameter; heel to tip of snout; snout broad but pointed; usually an X-shaped figure on the anterior part of the dorsum; 60 mm. . . . . *geographica geographica*
  B. Outer finger with more than 2 free phalanges (a basal or rudimentary web).
    1. Tympanum distinct, ½ or more the eye diameter.
      a. An external rudiment of pollex.
        1. Tympanum at least ¾ the eye diameter; snout moderate, subovoid; loreal region moderately oblique;

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[1] In *H. paramica*, *H. jahni* and *H. platydactyla* the vomerine teeth are very slightly oblique and on occasion may be almost transverse.

larger disks about ½ the size of the tympanum; light brownish above, usually with a large, diffuse, darker spot; flanks and thighs with fine crossbars *crepitans*

2. Tympanum ¾ the eye diameter; snout long, subelliptical; loreal region almost vertical; brown, usually with transverse bands above .... *albopunctata multifasciata*
3. Tympanum ½ the eye diameter; snout short, subovoid; largest disks larger than the tympanum; marbled with reddish brown and dark gray above; flanks with small, white spots .... *loveridgei*

b. No distinct rudiment of pollex.
   1. Tympanum ⅔ the eye diameter; largest disks about ⅓ the size of the tympanum; brown, usually vermiculated with darker above; a supra-tympanic streak that extends for a short distance posteriorly; thighs with distinct, broad crossbars .... *raniceps*
   2. Tympanum almost as large as the eye; a pair of longitudinal ridges on the head (margins of the frontoparietals elevated); largest disks almost as large as, or larger than, the tympanum; profusely (♂) or sparsely (♀) tubercular above; male with two lateral vocal sacs; brown above, sometimes with darker markings .... *taurina*

2. Tympanum indistinct or absent; where present, not quite ½ the eye diameter (usually ⅓).
   a. Snout almost semicircular; vomerine odontoids very slightly oblique; canthus not well defined; no distinct supratympanic fold; above, whitish, usually with scattered melanophores; no light canthal or supratympanic streaks; usually orange drab below; 31 mm.; Andes .... *paramica*
   b. Snout subovoid; vomerine odontoids slightly oblique; a supratympanic fold; above brownish, closely punctulated with darker brown or white (after long preservation) or uniformly whitish; a light canthal, palpebral and supratympanic lines; 34 mm.; Andes .... *jahni*
   c. Snout subovoid; vomerine odontoids slightly oblique; a supratympanic fold; above, purple, closely dotted with darker; arms and thighs white, with a stripe of closely set dark purple dots; 32 mm.; Andes .... *platydactyla*
   d. Snout subovoid; vomerine odontoids distinctly oblique; a distinct rudiment of pollex; color above brownish with darker transverse bands or uniform and with reticulations; ventral surfaces orange (when alive) or whitish (preserved); 37 mm.; Guayanan Cerros .... *benitezi*

II. Choanae small or moderate; vomerine odontoids in two groups, transverse or obliquely directed backwards and inwards.

A. Fingers free.
  1. First finger slightly longer than second.
    a. A light dorsolateral line that meets its opposite in a slight, backward notch between the eyes; 27 mm.; Guayanan Cerros . . . . *marahuaquensis*
  2. First finger shorter than second.
    a. Tympanum ⅔ to ¾ the eye diameter; snout long, subovoid; heel to the eye; above, brown or gray, sometimes with two long, longitudinal spots behind the eyes and white spots on the anterior and posterior part of the thighs; 38 mm. . . . . *rubra*
    b. Tympanum ⅔ the eye diameter; snout very long, subacuminate; heel to between eye and nostril or tip of the snout; brown or dark gray with a triangular spot between the eyes and usually other dark markings on the scapular region; thighs with alternating black and reddish bars on the anterior and posterior aspects; 40 mm. . . . . *boulengeri*
    c. Tympanum ½ the eye diameter; snout subovoid; heel to the eye; above, chlorine green (when alive) or yellowish gray (preserved); anterior and posterior part of the thighs of uniform color; 28 mm. . . . . *baumgardneri*

B. Fingers webbed.
  1. Tympanum absent.
    a. A white or yellow spot below the eye; upper surface of the thighs with white or yellow spots; 31 mm. . *luteocellata*
  2. Tympanum present, ½ or more the eye diameter.
    a. Outer finger fully webbed (1 phalanx = disk free).
      1. Snout almost semicircular; odontoids in an inverted chevron; forearm and tarsus with a festooned fringe; above, marbled with different shades of gray and brown; below orange (when alive) or white (preserved) with round, black spots; 35 mm. . . . . *m. marmorata*
    b. Outer finger not fully webbed.
      1. Tympanum ⅔ the eye diameter; snout rounded; loreal sloping; heel to the eye; skin with scattered glandules and tubercles especially in the surroundings of the tympanic region; male with two vocal sacs at the angle of the mouth.
        a. Size very large; color above more or less uniform; skin very thick and glandular; Maracaibo Basin . . . . *tibiatrix ingens*
        b. Size smaller; color above not generally uniform; skin not as thick and glandular as above; Venezuela, except Maracaibo Basin . . . . . . *tibiatrix tibiatrix*
      2. Tympanum ½ the eye diameter; snout rounded; heel to the eye; skin above smooth; above, slate or bronze colored; anterior and posterior part of the thigh and lower

surface of the hind limbs spotted with white; 42 mm.; Andes . . . . *vilsoniana meridensis*

3. Tympanum ⅓ the eye diameter; snout almost semicircular; eye diameter greater than distance between eye and nostril; heel to between eye and nostril; no tarsal fold; skin above, smooth; above, straw colored, generally with ornate, light margined markings of irregular shape; no dark canthal or supratympanic streaks; a transverse, distinct, light line above the anus and another longitudinal one at the heel; 26 mm.; Venezuelan Guayana . . *minuta*
4. Tympanum ½ the eye diameter; snout rounded; eye diameter greater than distance between eye and nostril; a tarsal fold; heel to between eye and nostril; skin above, smooth; brownish with obscure longitudinal markings; a canthal and a supratympanic streak; no distinct light line above the anus or at the heel; 20 mm.; Coastal Range . . . . *misera*
5. Tympanum ½ the eye diameter; snout pointed and projecting; loreal vertical; a slight tarsal fold; heel to anterior corner of the eye; skin above, shagreened, yellowish white in preservation; two horizontal flaps at the sides of the anus; 24 mm.; Venezuelan Guayana
. . . . *orophila planicola*
6. Tympanum ⅓ the eye diameter; snout rounded; heel to between eye and nostril; skin above, smooth; above and on the ventral surface of throat and limbs distinctly dotted with brown; 33 mm.; Coastal Range . *battersbyi*

HYLA BOANS (Linné)

Rana boans Linné, 1758, Syst. Nat., ed. 10: 213: America.

Hyla maxima Boettger, 1896, Ber. Senckenb. Naturf. Ges., LIV; Fowler, 1913, Proc. Acad. Nat. Sci. Phila., *65*: 170; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40, 47.

1 (U.P.R. 109) La Culebra, 1000 ft., iv.50.
1 (U.P.R. 110) Caño Chupadero, iii.50.
1 (U.P.R. 111) Anabén, Colombia, vi.50.
1 (M.C.Z. 19918) Orinoco R., below Caroní, i.35.

Description. Head depressed; snout subovoid; the nostrils somewhat elevated and forming a swollen tip; tongue subcircular, adherent and entire; vomerine odontoids forming a /‾ ‾\ figure behind the large choanae; eye diameter shorter than distance between eye and nostril; interorbital space concave, much broader than an upper eyelid; canthus obtusely angular; loreal sloping, concave; tympanum ⅔ the eye diameter, its posterodorsal margin slightly hidden under the skin; a dermal fold along the forearm; an external rudiment of pollex; fingers taken in order from first to fourth exhibit the following phalanges free of web: 2 to 2¼, 1, 1 to 1¾, 1; first finger shorter than second; larger disks about ⅔ the size of the tympanum; a triangular dermal appendage at the heel; two tarsal folds, the outer extending to disk of the fifth toe; no outer metatarsal tubercle; toes fully webbed; heel of the adpressed hind limb extends to between eye and nostril. Skin above finely granular; throat smooth or slightly granular.

Color. Above, brown with darker, irregular markings; flanks with short, dark crossbars or spots. Ventral surfaces white or greenish white; thighs posteriorly, dark brown, usually with obscure darker or lighter mottlings; hind limbs, especially the anterior part of the thighs, occasionally with diffuse crossbars.

Measurements. Snout-vent ♂ 75, ♀ 105; head breadth ♂ 28, ♀ 40; head length ♂ 27, ♀ 36; femur ♂ 41.5, ♀ 59; tibia ♂ 42, ♀ 58.5.

Habits. All the U.P.R. specimens were collected at night on the trunks of trees on heavily forested areas. Of three stomachs examined, two were empty and one had three grasshoppers of the same species.

Additional Localities. Arabopó (U.M.M.Z. 85162 [4], 85163, 85164 [2], 85165); Auyantepui (A.M.N.H. 39751); Casiquiare Canal, nr. Venado (U.S.N.M. 80661-4); Cuquenam Valley (U.M.M.Z. 85167 [2]); Esmeralda (A.M.N.H. 23223); Manamo, Caño (Fowler, 1913); Paulo (U.M.M.Z. 85161); Sn. Fernando de Atabapo (U.S.N.M. 80652); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana. A few specimens (U.M.M.Z. 55558-66) from the Coastal Range determined as *Hyla boans* (unfortunately not examined) may be *Hyla albopunctata.* Colombia and Trinidad to Bolivia and northern Brasil (Amazonas).

Remarks. U.S.N.M. 80652 is a large animal (125 mm.) with variegated coloration. It possibly represents some other form. *Hyla faber* and *Hyla boans* may be conspecific. Specimens of the latter with less web than usual are found in Amazonia and in the eastern base of the Andes of Colombia.

HYLA WAVRINI Parker

Hyla wavrini Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 2: Upper Orinoco, Territorio Amazonas, Venezuela.

No material examined.

Original Description. Head depressed, as long as broad; snout rather pointed, twice as long as the diameter of the eye; nostril more than twice as far from the eye as from the tip of the snout; tongue not emarginate and almost entirely adherent behind; vomerine odontoids in two series which together form a /‾ ‾\ between the very large choanae; interorbital space as broad as an upper eyelid; canthus obtusely rounded; loreal oblique and somewhat concave; tympanum very distinct, ⅔ the eye diameter; a supratympanic fold; fingers ⅔ webbed, the first with a projecting rudiment of pollex, much shorter than the second, which is shorter than the fourth; digital disks nearly as large as the tympanum; toes webbed to the disks; heel of the adpressed hind limb extends to the tip of the snout. Skin above, uniformly shagreened; dermal folds along the outer edges of the forearm and tarsus and a quadrangular lappet of skin on the heel. Lower surfaces granular, coarsely so on the belly and thighs, finely on the throat and chest.

Color. Pale purple brown above, with a median dark line from the snout to the middle of the back; rest of the other surfaces with a few irregular, dark scribblings. Limbs crossbarred on the exposed surfaces; their concealed surfaces with black, light centered, vertical bars. Lower surfaces uniform white. Lower eyelid with metallic venation. Bones green.

Measurements. ♀ snout-vent 75; forelimb 45; hind limb 128.

Remarks. The paratype is a male with the same data as the type; it agrees in essentials, but is slightly larger (78 mm. in snout to vent length), has a more prominent pollex, a vocal sac opening by a large slit on each side of the tongue, a brown washed gular region and almost uniform dorsal coloring.

The species is obviously allied to *Hyla faber* Wied and *Hyla pardalis* Spix, but differs from both in its longer, flatter head, shagreened dorsal surfaces and green bones (Parker, *op. cit.*).

HYLA ALBOMARGINATA Spix

Hyla albomarginata Spix, 1824, Spec. Nov. Testud. Ran.: 33, pl. viii: Bahía; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 43.

1 (M.C.Z. 15369) Maracaibo, v.06.

Description. Snout subovoid; tongue oval, adherent, slightly nicked behind: vomerine odontoids forming a /‾ ‾\ figure between the large, oval choanae; eye large, its diameter slightly shorter than distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus moderate; loreal oblique, not concave; tympanum distinct, about ½ the eye diameter; a longitudinal fold from elbow to hand; an external rudiment of pollex; first finger shorter than second;

fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 2, 2½, 2; heel with a short dermal appendage; a tarsal fold; one flat, inner metatarsal tubercle, no outer; toes exhibiting the following free phalanges: 1½, 1, 1½, 2½, 1⅓; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to slightly beyond the tip of the snout. Skin above and on the sides of the head finely granular; a pair of dorsolateral folds from posterior corner of the eye, along the flanks, to the groins.

Color. The color of the only Venezuelan specimen available is faded and the animal presents a creamy white appearance throughout. Brasilian specimens are light brown, closely punctuated with darker brown. Noble (1918: 342) describes the living animal as green, with bluish throat, lemon yellow belly, bluish legs, yellow feet and hands, and orange web.

Measurements. ♂ snout-vent 51; head breadth 18; head length 16.5; femur 27; tibia 29.

Range. Maracaibo Basin. Central America, Colombia and British Guiana to southern Brasil. No records available from Ecuador, Bolivia and Perú.

Remarks. I do not find much difference between the Venezuelan example and specimens from Pernambuco, Brasil.

Lutz bases the inclusion of this species in the Venezuelan fauna on a specimen which he says was collected by Robinson. I have not found this species mentioned in Stejneger's report on Lyon and Robinson's collection but the specimen reported here undoubtedly belongs to *Hyla albomarginata.*

Hyla granosa Boulenger

Hyla granosa Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 358, pl. xxiv, figs. 1, 2: Demerara Falls: Santarem; interior of Brasil and Canelos, Ecuador.

8 (U.P.R. 118-25) La Culebra, 1000 ft., v.50.
1 (U.P.R. 199) Anabén, Colombia, vi.50.

Description. Head depressed; snout rounded; nostrils somewhat elevated and forming a truncate tip; tongue rounded, adherent and entire; vomerine odontoids in two oblique groups between the choanae, their anterior extremities convergent; eye diameter slightly shorter than distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus indistinct; loreal strongly sloping, somewhat concave; tympanum not very distinct, about ½ the eye diameter; an external rudiment of pollex; subarticular tubercles small, round, somewhat depressed; first finger shorter than second; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 1⅞ to 2, 2½, 2; a tarsal fold; one small, oval inner metatarsal tubercle; toes with the following free phalanges: 1¾ to 1⅞, 1 to 1⅓, 1 to 1¼, 1⅔ to 2, 1½; heel of the adpressed hind limb extends to the anterior corner of the eye or slightly beyond. Skin above and on the sides of the head and body minutely granular; a strong fold across the chest. Male with an external, subgular vocal sac.

Color. Above, green (yellowish white in alcohol); occasionally a distinctive light brown spot between the eyes or on the back or legs; minute brown points under a lens. Ventral surfaces white.

Measurements. ♂ Snout-vent 40; head breadth 15; head length 13; femur 19; tibia 16.5.

Habits. The species was heard in bushes along the banks of the Orinoco from a little beyond Sanariapo to the upper reaches of Río Cunucunuma. Sometimes one may walk for several miles without hearing the peculiar marimba-like call of *granosa* until attracted by it to a bush that is full of frogs. Usually the area occupied does not cover more than a few square yards. Similar conditions were observed for several other *Hyla* in South America.

Range. The Venezuelan Guayana. British Guiana and northern Brasil, ?Ecuador.

Remarks. I think it would be advisable to restrict the locality of this species but I prefer to leave the problem to someone having access to the typical material. My impression is that Boulenger's "g" specimen from Canelos may be *Hyla punctata,* which has been found in Ecuador by Peracca (1904). This, of course, is not conclusive evidence and the fact that *H. granosa* has been collected in Río Uaupés somewhat detracts from it; consequently, it is as well not to restrict the type locality until these suggestions can be verified.

Melin (1941: 21) has described a new subspecies from the Uaupés River in northern Brasil. He characterizes the new form by the different coloration (greenish yellow), absence of claw-like pollex, more slender build, less webbing and narrower limbs. Perhaps Melin ascertained from the British Museum to which of Boulenger's specimens the figure corresponds but I do not find anything in the literature in this respect. It is even possible that the figured specimen came right from the type locality of Melin's *Hyla granosa gracilis.*

Since Boulenger had preserved material, the first differential character of *H. granosa gracilis* should not be taken into consideration, while the third and last, which were based on Boulenger's figure, might be due to individual differences or to the different conditions of preservation. A small spinule is felt in the pollex of the males from Venezuela and British Guiana (specimens examined: A.M.N.H. 39734, 39985, 45752, 46234, 49260, 49262; U.S.N.M. 118053-4, all from British Guiana), and in all there is some individual variation in regard to the amount of webbing. Consequently, I have preferred to retain the binomial.

Hyla granosa resembles *Hyla punctata* but can be distinguished by its laterally situated eyes (in *punctata* they look somewhat to the front), granular skin, large disks, more sloping loreal region, smaller tympanum and more extensive webbing between the toes. This species is found in British Guiana and in all probability occurs in Venezuela.

Hyla ornatissima Noble is, I believe, a synonym. The ornate coloration of the type (*vide*) is found, though to a lesser extent, in several of the specimens of *Hyla granosa* reported here.

HYLA GEOGRAPHICA GEOGRAPHICA Spix

Hyla geographica Spix, 1824, Spec. Nov. Test. Ran.: 39, pl. xi, fig. 1: Teffé River, Amazonas, Brasil; Günther (part or all?), 1858, Cat. Batr. Sal. Brit. Mus.: 99.

1 (Senckenb. Mus. 2432) Iguapo, Upper Orinoco, v.1895.

Description. Head as broad as long; snout broad, subovoid; tongue oval, adherent and nicked behind; vomerine odontoids forming a ╱ ╲ figure between the large choanae;; eye diameter equal to distance between eye and nostril; interorbital space broader than an upper eyelid; canthus curved, rounded but well defined; loreal oblique; tympanum ¾ the eye diameter; no distinct supratympanic fold; an outer fold between elbow and disk of fourth finger; no apparent rudiment of pollex; fingers taken in order from first to fourth show the following phalanges free of web; all, 1⅞, 2½, 2; first finger shorter than second; disks of fingers not more than ¼ the size of the tympanum; a pointed lappet at the heel; a distinct tarsal fold; no apparent metatarsal tubercles; toes exhibiting the following free phalanges: 1, 1, 1½, 2½, 1; disks of the toes smaller than those of the fingers; hind limbs slender; heel of the adpressed hind limb extends to the middle of the snout. Skin above, shagreened.

Color. Above, light brown, with an irregular, darker marking that starts behind the eyes with two horns which unite and broaden posteriorly into a more extensive spot; a dark vertebral line from tip of the snout to scapular region; a not too distinct spot behind the sacrum; flanks with dark transverse striations; thighs with narrow transverse bands and reticulations; anterior and posterior aspect of thighs darker than dorsolateral portions; rest of the limbs crossbarred with alternating broad and narrow stripes. Below, brownish.

Measurements. ♂ ? snout-vent 40; head length 15; head breadth 15; femur 21; tibia 21.

Additional Localities. Venezuela (Günther, 1858); ?Iguapo (Senckenb. Mus. 2590 = Boettger, 1896, *H. punctatissima*).

Range. Venezuelan Guayana. According to Parker (1935): Cis-Andean Ecuador and Perú, Amazonas, Pará, Guianas and Trinidad.

Remarks. Parker (1935) does not mention the differences between *Hyla g. geographica* and *H. g. punctatissima* and Boulenger (1882) had both races in his *H. appendiculata.*

For comparison with the only specimen from the north, I had material from Sta. Catharina, Brasil, Robore and Buena Vista, Bolivia. The Brasilian animals seem to have a straighter canthus and a little more web in the fingers. The snout is longer (eye diameter shorter than distance between eye and nostril) and in most of the larger specimens, broader. Instead of the transverse vermiculations of the flanks, the Sta. Catharina animals have profuse dark dotting, and except for some ill-defined transverse bars on the posterior part of the dorsum of some specimens, or occasional black spots, there is no other dorsal pattern. The thigh bars are closer together and do not surround white areas or spots, and transverse limb bars are not present in several specimens.

The Bolivian specimens show a pattern similar to the Venezuelan example but the large spots are more abundant and there is sometimes profuse dotting of the dorsal surfaces. The limb bars are usually very well defined but the flanks sometimes show white, black-margined spots instead of bars or dark spotting. In M.C.Z. 12869 and 29849 the venter is covered with brown, equidistant and irregularly-shaped spots. The canthus in these specimens is not well defined and the eyes do not seem to be as large or protuberant as in either Brasilian or Venezuelan examples. They are as different from the northern as from the southern

Brasilian animals and further studies will probably indicate them to be racially distinct.

The juvenile form of *H. crepitans* is probably punctate above, as is that of *H. geographica.*

HYLA CREPITANS Wied

Hyla crepitans Wied, 1824, Abbild. Naturg. Bras.: (4) *5*, pl. v, fig. 1: Bahía; Peters, 1877, Monatsb. Akad. Wissensch. Berlin: 460; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 352; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 40; 1893, Ber. Senckenb. Naturf. Ges.: 40; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Stejneger, 1902, Proc. U.S. Nat. Mus., *24*: 181; Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 481; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 43, pl. xv, figs. 35, 35a, 36, 36a, 36b; Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 2; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 536; Röhl, E., 1949, Fauna Descr. de Ven., ed. 2: 400, fig. 180; Alemán, 1952, Mem. Soc. Cienc. Nat. La Salle, *12*: 27.

Hyla pardalis Günther (part or all?), 1858, Cat. Batr. Sal. Brit. Mus.: 99.

6 (M.C.Z. 25978-83) Paují.
1 (M.C.Z. 26142) Riecito.

Description. Head broader than long; snout broad-subovoid; tongue oval or subcircular, adherent, entire or emarginate behind; vomerine odontoids forming a /‾ ‾\ figure between the large, oval choanae; eye diameter equal or slightly shorter than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus rounded; loreal moderately oblique, not concave in fresh specimens; tympanum $\frac{3}{4}$ the eye diameter; a supratympanic fold; an outer, sometimes indistinct, fold from elbow to disk of fourth finger; an external rudiment of pollex; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, $1\frac{7}{8}$ to 2, 2 to $2\frac{1}{2}$, $2\frac{1}{3}$ to $2\frac{1}{2}$; first finger shorter than second; disks of the fingers not more than $\frac{1}{2}$ the size of the tympanum; a slight tarsal fold; outer metatarsal tubercle absent; toes exhibiting the following free phalanges: 1 to $1\frac{1}{2}$, 1 to $1\frac{1}{4}$, $1\frac{1}{4}$ to $1\frac{1}{2}$, $2\frac{1}{2}$ to $2\frac{2}{3}$, 1 to $1\frac{1}{4}$; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the tip of the snout or slightly beyond. Skin above, smooth. Male with a subgular vocal sac.

Color. Above, light brown or creamy, generally with a large, central, diffuse spot; flanks lighter, with narrow transverse lines on the posterior half; thighs with narrow transverse bars that sometimes broaden and become more diffuse above; tibial segment uniform or with irregular, diffuse spots. Below, yellowish gray or white, the throat usually speckled with dark.

The color of the living animal was described by Kugler (Shreve, 1947): "Above white, almost silver white, with large black eyes, whose grayish eyelids have a fine black ring around the base; finger tips and belly light yellow. One pair taken in embrace had brownish markings on a yellow ground, another mating pair exhibited brown marblings exactly the shade of the soil."

Measurements. Snout-vent ♂ 62, ♀ 65; head breadth ♂ 22, ♀ 22; head length ♂ 20.5, ♀ 21; femur ♂ 33, ♀ 31; tibia ♂ 33, ♀ 33.

Habits. Of three stomachs examined two were empty and one contained a cricket and a beetle.

In the M.C.Z. Paují group (iv-xi.44), one female is full of eggs.

Additional Localities. Albarregas, Río (A.M.N.H. 10521-4); Arabopó (U.M.M.Z. 85192-4, 85196[2]); Baruta (Alemán, 1952); Bejuma (U.M.M.Z. 55564); Boca de Río (U.S.N.M. 128790); Calabozo (Peters, 1877); Caracas (U.S.N.M. 55329-30, 120091, 129264; U.C.V. 821; Günther, 1858; Boettger, 1882); Caicara (A.M.N.H. 16907-10; U.S.N.M. 36376); Caserío Silva (U.M.M.Z. 55565); Chama (A.M.N.H. 10632-3); Cuquenán Valley (U.M.M.Z. 85189[2]); El Limón (U.S.N.M. 12159-61); El Periquito (U.C.V. 91-5); El Valle (C.N.H.M. 26188; U.S.N.M. 128791); Espino (U.C.V. 53, 521); Güiria, Península de Paria (M.C.Z. 23024-8); Kunana, Perijá Mts. (Alemán, 1953); La Cruz Pruviera (U.S.N.M. 72757-8); La Guaira (U.S.N.M. 22543-4 [=Stejneger, 1902]; Los Canales (U.S.N.M. 128787-9); Macuto (U.C.V. 79); Maracay (Lutz, 1927); Mérida (M.C.Z. 2525; C.N.H.M. 3569-70; Boulenger, 1903); Ocumare del Tuy (U.C.V. 49); Palma Sola (U.M.M.Z. 55563); Parmana (U.C.V. 50); Paulo (A.M.N.H. 39756); Petare (U.S.N.M. 121162); Pie del Cerro (U.S.N.M. 121154-7); Puerto Cabello (Boettger, 1893); Sn. Esteban (U.M.M.Z. 55558-62); Sn. Juan de los Morros (U.S.N.M. 72756); Sierra Maestra, 1,260 m. (U.S.N.M. 129575); Sosa (U.C.V. 87); Sta. Lucía (U.S.N.M. 121152-3); Turgua (Alemán, 1952); Upper Orinoco (Boettger, 1896; Parker, 1936); Urama (C.N.H.M. 26185, 29184-5); Yumarito (U.M.M.Z. 55566); Venezuela (C.N.H.M. 28115-6; Günther, 1858); Zaraza (U.C.V. 30).

Range. Probably all the physiographical provinces of Venezuela including the Andes to 1,600 m., Central America, Colombia, Trinidad and the Guianas to southern Brasil. No records available from Ecuador, Bolivia, and Perú.

Remarks. I do not find much geographic variation in this species from Panama to Minas Gerais, although there is much individual variation everywhere. A dark vertebral line is occasionally present in specimens from any locality and the throat is profusely infuscated in fresh males. In specimens from the Magdalena Valley, Colombia (M.C.Z. 21475-83), the head is narrower than usual and there is fine granulation on the anterior third of the body. In M.C.Z. 2204 from Trinidad the snout is very broad and flat while M.C.Z. 26655 from Sao Paulo, Brasil, has dark dots over the dorsal surface. Apparently this last animal is not identical with *H. crepitans*. The specimens from La Cruz Pruviera reported here show broad bars that bifurcate on the posterior part of the thighs.

Specimens from Casa de Julián (U.P.R. 130-1) are provisionally included here although I have little doubt that they belong to some other form. The tympanum is about the same size as the eye (as it is in some *H. crepitans*), the heel extends to between eye and nostril and the color alive was distinctly different from that described by Kugler and others for the living *H. crepitans*. The dorsum in both specimens was dark green, the flanks light green, transversely striped with brown; loins blue; ventral surface of the limbs greenish blue and the throat yellow. Both specimens were collected at night upon being guided by their short, sporadic "crah crah." One of them was on the ground near a shallow stream; the other was sitting on the leaf of a Taro plant. These specimens agree in almost all structural characters with *H. crepitans* but their size is considerably smaller (the larger 46.5 mm.) than any adult males of *crepitans* observed and even the color in preservation is different. The type of *Hyla indris* Cope which is supposed to be very similar to *crepitans* has not been found.

Several specimens from Venezuela and British Guiana that were determined as *Hyla pardalis* in various museums have proven to be *Hyla crepitans*.

HYLA ALBOPUNCTATA MULTIFASCIATA Günther

Hyla multifasciata Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 101, 146, pl. viii, fig. D: Pará.

?Hyla rostrata Peters, 1863, Monatsb. Akad. Wissensch. Berlin: 466.

2 (U.M.M.Z. 85178) Arabopó.

2 (U.M.M.Z. 85179) Arabopó.
1 (U.M.M.Z. 85180) Cuquenam Valley.

Description. Snout long, subelliptical; tongue narrow, oval, adherent, entire or emarginate behind; vomerine odontoids in a /‾ ‾\ series between the large, oval choanae; eye diameter shorter than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus distinct; loreal almost straight, concave; tympanum about ¾ the eye diameter; a supratympanic fold from posterior corner of the eye to above the shoulder or farther back along the flank; a longitudinal fold along the forearm; a not very prominent rudiment of pollex; subarticular tubercles very prominent; first finger shorter than second, practically free; others with a short basal web; disks narrow, much smaller than the tympanum; hind limbs very long and slender; a slight tarsal fold; toes taken in order from first to fifth exhibit the following phalanges free of web: 1⅔, 1, 1½, 2½ to 3, 1 to 1¼; heel of the adpressed hind limb extends to the tip of the snout or beyond. Skin above smooth; a fold across the chest. Male with a subgular, external vocal sac.

Color. Above, brown, usually with light-margined, transverse bands and a dark vertebral line; apparently a canthal streak; a transverse light glandular ridge line above the anus; limbs generally crossbarred; flanks and posterior part of the thighs uniformly brown. Below, light brownish.

Measurements. Snout-vent ♂ 47, ♀ 49; head breadth ♂ 13.5, ♀ 14; head length ♂ 15.2, ♀ 17; femur ♂ 24, ♀ 27; tibia ♂ 26, ♀ 31.

Range. The eastern Venezuelan Guayana. The species extends from British Guiana to southern Brasil. The race appears to stop in the vicinity of latitudes 5° and 10°.

Remarks. As far back as 1900 Andersson pointed out that *Hyla maxima* Laurenti was a synonym of *Rana boans* Linné and that *Hyla boans* Daudin should receive another name, for which he proposed *Hyla albopunctata* Spix. Apparently overlooking this, Ahl (1939: 318) suggested that the name *Hyla boans* Daudin be changed to *Hyla albopunctata,* due to preoccupation by *Calamita boans* Schneider, 1799 (= *Hyla tibiatrix* Laurenti, 1768). This is not the case, however, and in 1940, Mertens (p. 195) reemphasized that *boans* is only applicable to *Hyla maxima* Laurenti and not to *Hyla tibiatrix* Laurenti. Confusion still persists in some museums where the two very different species *Hyla albopunctata* Spix and *Hyla boans* (Linné) are included under the same name.

Besides the 5 Venezuelan specimens, I have examined 36 from British Guiana (A.M.N.H., U.M.M.Z.) and 4 from Paraguay and Brasil (M.C.Z.). The northern and southern animals show a decided difference in the coloration of the dorsum, flanks and limbs. In the Brasil-Paraguay group, both the flanks and the posterior part of the thighs are spotted with white (as described by Spix) and the dorsum is not crossbanded (except in one case, where the bands are somewhat diffuse and the design quite different from the condition found in the northern animals). The 5 Venezuelan frogs (one indistinctly) and most of those from British Guiana are banded above and the flanks and hinder part of the thighs of all of them are of a plain brown color. It is interesting to note that Daudin, most of whose specimens were apparently from Surinam, and Boulenger, who also had the greater number of specimens from the north, do not describe any white spots on the flanks and limbs. Duméril and Bibron (1841) make no mention of the white spots and they had animals from "Surinam, Cayenne et du Brésil." Cochran (personal communication) and Ruthven (1919) have also spoken of the uniform coloration of the posterior part of the thighs and flanks in specimens from British Guiana.

The frog from Río Bermejo named *Hypsiboas raniceps* by Cope (1862) was thought later to be identical (Cope, 1863) with Reinhardt and Luetken's *Hyla oxyrhina* described as having white spots. Dr. Cochran, however, tells me (letter, 16.10.51) that these two species should be kept distinct. In a recent paper (1955: 80) she puts *H. oxyrhina* in the synonymy of *H. albopunctata* and *H. spegazzini* in the synonymy of *H. raniceps*. *Hyla multifasciata* Günther, 1858, and *Hyla boans* Bauman, 1912, refer to specimens from Pará, none of which had the white spots. Parker (1935) does not say anything of his British Guiana specimens but (1928) describes the white spots in animals from Brasil.

Shreve (1935: 211) pointed out the difference between *Hyla boans* Daudin and *Hyla albopunctata* Spix but the specimen of "*boans*" he had was *Hyla raniceps* (erroneously det. as *boans* in M.C.Z.) from Pernambuco. This apparently led him to conclude that *H. raniceps* (*spegazzini* auct.) could be a southern representative of *H. boans*.

As the present distribution and the morphological characters of the species only suggest subspecific differentiation between the northern and the southern form, the name *Hyla albopunctata multifasciata* is suggested for the animal occurring north of the Amazon.

Although I have examined considerable material from the Coastal Range of Venezuela, no specimen from that region agrees with Peter's description of *Hyla rostrata*. *Hyla albopunctata multifasciata* agrees in many important details with this description and in all probability, *rostrata* is a synonym of this species.

HYLA LOVERIDGEI sp. n.

Figure 8

Type. Museum of Comparative Zoology No. 28565, a ♂ from Pico Culebra, Mt. Duida, 3000 ft., Territorio Amazonas. Coll. J. A. Rivero, 4 May 1950.

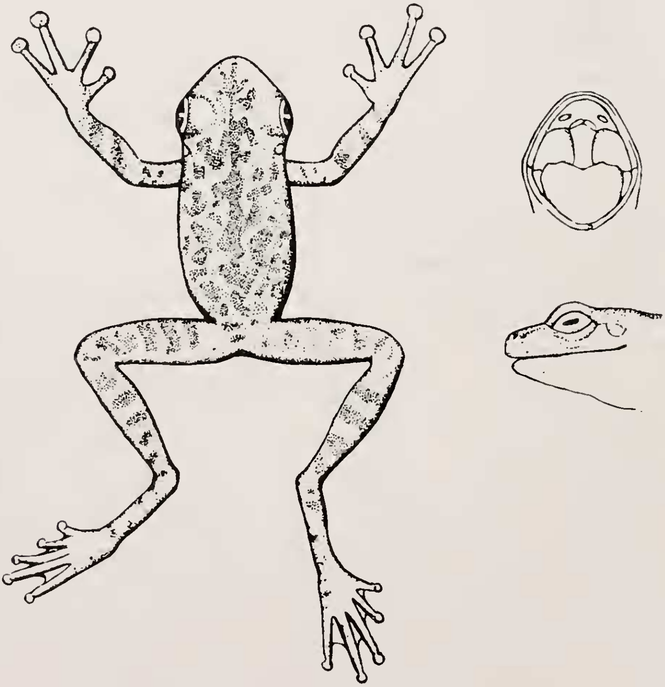

Fig. 8. *Hyla loveridgei* sp. n. Type M.C.Z. 28565.

Diagnosis. A medium sized *Hyla* with broad, adherent tongue; tympanum ½ the eye diameter; outer finger with three free phalanges; a blunt pollex; disks of the fingers larger than the tympanum; disks of the toes much smaller than those of the fingers; heel extending to between eye and nostril and marbled coloration above.

Description. Snout rounded; tongue very broad, adherent and nicked behind; vomerine odontoids forming a /‾ ‾\ figure between the large, oval choanae; eye diameter very slightly greater than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus moderate; loreal slightly oblique, concave; tympanum ½ the eye diameter, its dorsal margin covered by a supratympanic fold that runs to the shoulder; a row of closely set tubercles along the forearm; a blunt, external rudiment of pollex; first finger shorter than second; subarticular tubercles moderate; disks large, the largest larger than the tympanum; outer three fingers with a rudiment of web; a very distinct transverse fold at the heel; a slight tarsal fold; two metatarsal tubercles, the outer small, round and indistinct; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1½, 1½, 3, 1⅔; disks of the toes much smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth. Male with a brown rugosity on the pollex and inner finger but no apparent external vocal sac.

Color. Above, reddish brown marbled with black; flanks with numerous small whitish spots; limbs crossbarred. Below, immaculate.

Measurements. ♂ Snout-vent 42; head breadth 15; head length 14.5; femur 20; tibia 22.

Habits. The only specimen was taken at about 3 P.M. as it sprang from beneath (or near?) a rock in a treeless, rocky area of Mt. Duida.

Remarks. Like *Hyla callipleura*, this species has white spots on the flanks but these are small and less distinct than in the Bolivian animal which also has a completely different coloration above, less webbed fingers, and different vomerine teeth.

Hyla raniceps (Cope)

Hypsiboas raniceps Cope, 1862, Proc. Acad. Nat. Sci. Phila., *14*: 353: Río Vermejo, Paraguay.

1 (A.M.N.H. 13055) Cucuhy R.

Description. Snout subovoid; tongue broad, cordiform, slightly free and nicked behind; vomerine odontoids forming a /‾ ‾\ figure between the moderate choanae; eye diameter equal to distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus well defined, curved; loreal almost vertical, slightly concave; tympanum oblique, ⅔ the eye diameter; a dorsolateral fold from posterior corner of the eye to behind the shoulder; no external rudiment of pollex; a slight fold along the forearm; one elongated but flat and indistinct inner metacarpal tubercle; fingers with a short basal web (all, 2, 2⅞, 2¾); disks small, the largest about ⅓ the size of the tympanum; a slight tarsal fold; a triangular dermal appendage at the heel; a small, oval, inner, and a minute, rounded, outer metatarsal tubercle; toes fully webbed with the exception of the fourth, where two phalanges are left free; heel of the adpressed hind limb extends to between eye and nostril. Skin above, very finely granular.

Color. Above, brown, with distinctive darker vermiculations; loreal region darker than the rest of the head; a dark supratympanic streak continues with the fold for about ⅓ of the length of the flank; posterior part of the thighs yellowish brown with broad, dark brown crossbars that become diffuse and less distinct above and then darker again on the anteroventral portion; rest of the hind limbs with diffuse spots that sometimes form crossbars; ventral surfaces yellowish brown.

Measurements. ♀ Snout-vent 70; head breadth 23; head length 21; femur 34.5; tibia 38.

Habits. Collected on ground in open grass during the day.

Range. Only known from this specimen in Venezuela. Pará and S. Venezuela to Chaco Argentino.

Remarks. Comparison of this specimen with seven examples from Paraguay (M.C.Z. 24811-6, Dept. Villeta) reveals these last to be smaller (larger, 63 mm.), having a more pointed snout, occasionally a vertebral stripe and always a longer hind limb, the heel of the adpressed hind limb extending to the nostril or tip of the snout. Some males in this group have moderate, subgulopectoral vocal sacs.

Cochran (1955:96) has discovered that *Hyla spegazzini* Boulenger is a synonym of *Hyla raniceps* (Cope).

HYLA TAURINA (Steindachner)

Osteocephalus taurinus Steindachner, 1862, Archiv. per. la Zool., *2*: 77, pl. vi, figs. 1-3: Río Negro, Brasil; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 363.

Hyla taurina Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

1 (U.P.R. 113) Tapara, v.50.
2 (U.P.R. 114-5) Mt. Marahuaca, v.50.
1 (U.P.R. 116) La Culebra, 1000 ft., vi.50.
1 (U.P.R. 117) Pto. Ayacucho, vi.50.

Description. Head depressed; skull rugose; snout rounded in the female, less so in the male; tongue adherent, subcircular or broadly oval, entire and slightly free behind; vomerine odontoids in a /‾ ‾\ figure between the oval, oblique choanae; eye diameter about ¾ the distance between the eye and nostril; interorbital space much broader than an upper eyelid, with two bony ridges of varied prominency that extend back to the occipital region; canthus strong; loreal concave, sloping in the female, almost straight in the male; tympanum distinct, almost as large as the eye; a distinct supratympanic fold; no distinct rudiment of pollex; subarticular tubercle of the outer finger double; first finger shorter than second; taken in order from first to fourth, the fingers exhibit the following phalanges free of web: all, 1¾, 2⅔ to 2¾, 2½ to 2⅔; larger disks almost as large as the tympanum; a small, round, outer and a prominent, inner metatarsal tubercle; fourth toe leaving from 2 to 2½ free phalanges, others completely webbed; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the nostril. Skin above, with small, flat tubercles in the female, distinctly tubercular in the male. Male with a pair of black vocal pouches behind the angle of the jaw and a brown rugosity in the inner side of the first digit.

Color. Above, brown with irregular and generally obscure darker blotches; flanks occasionally spotted with white; limbs crossbarred, the hind part of the thighs uniformly brown. Lower surfaces grayish white, generally reticulated with brown.

Measurements. Snout-vent ♂ 73, ♀ 86; head breadth ♂ 24, ♀ 28; head length ♂ 24, ♀ 26.5; femur ♂ 36, ♀ 41; tibia ♂ 37.5, ♀ 44.

Habits. All specimens were taken at night on the lower branches of trees or palm fronds, usually near water. The voice is a deep croak similar to that of *Hyla boans.* U.P.R. 117 was full of eggs.

Additional Localities. Caracas (Boulenger, 1882); Esmeralda (A.M.N.H. 23174); Pescado, Caño (A.M.N.H. 27777); Yapacana (U.S.N.M. 83947); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana. British Guiana, Ecuador, Bolivia, N. Brasil and probably southeastern Colombia.

Remarks. The male of this species is quite different from the female (snout less broad, cranial ridges less prominent, dorsum distinctly tubercular), and rather similar to some males of *Hyla* *tibiatrix,* from which it can be immediately distinguished by the position of the vomerine teeth.

See remarks under *Hyla tibiatrix.*

HYLA PARAMICA sp. n.

Type. Museum of Zoology University of Michigan No. 59016, a ♂ from Escorial, Venezuela.

Diagnosis. A small *Hyla* with an almost semicircular snout; long, almost transverse vomerine teeth situated immediately behind the choanae; adherent tongue; small, indistinct tympanum; outer finger with 2¼ free phalanges; heel extending to the eye and smooth dorsal surfaces.

Description. Snout short, almost semicircular; tongue broad, entire and adherent; vomerine odontoids in two long, scarcely oblique, almost continuous groups, slightly behind the moderate choanae, their converging anterior extremities extending to the level of the inner margin of the latter; eye diameter equal to distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus rounded, much curved; loreal slightly oblique, not concave; tympanum small and indistinct, not quite ½ the eye diameter; a blunt rudiment of pollex; one oval, inner metacarpal tubercle; subarticular tubercles small; first finger shorter than second; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 2, 2½, 2¼; disks small, the largest slightly smaller than the tympanum; no tarsal fold; inner metatarsal tubercle very indistinct, outer absent; toes exhibiting the following free phalanges: 2, 1½, 1⅞, 3, 1½; heel of the adpressed hind limb extends to anterior corner of the eye. Skin above, smooth.

Color. Above, yellowish white with scattered, small melanophores; anterior and posterior part of the thighs with a slight reddish tinge. Below, yellowish.

Measurements. ♂ Snout-vent 31; head breadth 11.5; head length 10; femur 14.5; tibia 15.5.

Remarks. The following specimens are designated as paratypes:

C.N.H.M. 3567, a ♀ from Escorial. Snout-vent 32; head breadth 16; head length 11; femur 15; tibia 16.5. Tympanum slightly less distinct than in the type and pollex considerably more prominent but always blunt and unhooked.

C.N.H.M. 3568, a ♀ from Escorial. Snout-vent 34; head breadth 12; head length 10.5; femur 17; tibia 17.5. Pollex more prominent than in the type; a definite orange tinge on the sides of the head, throat, chest and underside of the hind limbs.

A.M.N.H. 10636, ♂, La Culata, 3000 m. Snout-vent 35; head breadth 11.5; head length 11; femur 15.5; tibia 16.5. A rounded pollex and a slight external vocal sac; throat, loins and thighs below, orange drab.

A.M.N.H. 10639, ♀, La. Culata, 3000 m. Snout-vent 28; head breadth 11; head length 10; femur 14; tibia 14.5. Orange drab on the dorsum, back of the head and on the belly.

This species is somewhat similar to *H. jahni* from which it can be distinguished by the rounded snout, less defined canthus, lack of supratympanic fold and absence of canthal, palpebral and supratympanic lines.

HYLA JAHNI sp. n.

Type. Museum of Zoology University of Michigan No. 46465, a ♂ from Escorial, Venezuela.

Diagnosis. A small *Hyla* with subovoid snout; adherent tongue; slightly oblique vomerine teeth behind the choanae; hidden or indistinct tympanum; flat fingers and toes; outer finger with 2½ free phalanges; heel extending to the anterior corner of the eye; punctuated dorsal surfaces and light line along the canthus and supratympanic fold.

Description. Snout subovoid; tongue circular, adherent and very slightly nicked behind; vomerine odontoids in two slightly oblique groups behind the choanae, their converging anterior extremities extending to the horizontal of the inner margin of the latter; eye diameter more or less equal to distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus distinct, curved; loreal almost vertical, not concave; tympanum hidden; a very distinctive fold from posterior corner of the eye to slightly behind the axilla; no distinct external rudiment of pollex; a prominent oval, inner metacarpal tubercle; first finger shorter than second; fingers and toes flattened; taken in order from first to fourth, the fingers exhibit the following phalanges free of web: all, 2, 2½, 2½; subarticular tubercles small; one flat and indistinct inner metatarsal tubercle but no outer; toes exhibiting the following free phalanges: 1⅞, 1½, 1⅔, 2¾, 1; heel of the adpressed hind limb extends to anterior corner of the eye. Skin above, smooth.

Color. Above, brown, closely punctuated with darker brown; canthus, margin of upper eyelid, and probably the supratympanic fold with a light line; anterior and posterior part of the thighs plain brownish.

Measurements. ♂ Snout-vent 34.5; head breadth 11.5; head length 11; femur 15.5; tibia 16.5.

Remarks. The following specimens have been designated as paratypes:

U.M.M.Z. 59016, a ♀ from Escorial. Snout-vent 29; head breadth 11; head length 9.5; femur 15; tibia 16. Tongue entire; vomerine teeth juxtaposed; tympanum present but indistinct, not quite ½ the eye diameter; disks larger than the tympanum; toes exhibiting the following phalanges free of web: 1¾, 1¼, 1½, 2¾, 1½; heel extending to between eye and nostril; color uniform yellowish above and below.

U.M.M.Z. 46465, a ♀ from Escorial. Snout-vent 25; head breadth 8.5; head length 8; femur 12.5; tibia 12.5. Tympanum hidden or almost so; color above whitish with dark points that are scattered and less distinct than in the type. Canthal line distinct.

M.C.Z. 2523, a ♂ from Mérida. Snout-vent 24.5; head breadth 11.5; head length 7.5; femur 12; tibia 12. Tympanum indistinct; color above and below whitish; white supratympanic line present.

A.M.N.H. 10637, a ♀ from La Culata, 3,000 m. Snout-vent 26; head breadth 8; head length 7.5; femur 12.5; tibia 13. Tympanum hidden; fingers appear to be shorter relatively than in the type; punctuation above, white instead of dark; canthal, palpebral and supraorbital lines distinct; ground color above and below, yellowish white.

A.M.N.H. 10638, a ♂ from La Culata, 3,000 m. Snout-vent 31.5; head breadth 11; head length 10.5; femur 14.5; tibia 16. Tympanum very indistinct, almost hidden; rudiment of pollex more distinct than in the type and other specimens; supratympanic fold extending for some distance along the flank; canthal, palpebral and supratympanic lines distinct; ground color above yellowish, with white punctuation; hind limbs below, with an orange drab.

A.M.N.H. 10640, a ♂ from La Culata, 3,000 m. Snout-vent 31.5; head breadth 11; head length 10.5; femur 15; tibia 16. Tympanum almost hidden; ground color brownish; canthal, palpebral and supratympanic lines golden; color above and below brownish with dark punctuation above.

The dark punctuation of the dorsal surface may become light or even disappear on preservation. When present, this species looks somewhat like *Hyla albomarginata* but can be distinguished from that form by its smaller size and many other characters.

Hyla jahni appears to be restricted to the high elevations of the Andes where *Hyla albomarginata* does not exist.

Specimens of *Hyla jahni* have been also confused with *Hyla punctata* but although this form, or a race of it, may be found in Venezuela, it is unlikely to be in the Andes as high as 2,000 m. *Hyla punctata* has large, well defined tympana that are about ⅔ the eye diameter, the eyes are partially directed forwards and the small spots above are scattered and always white in preservation.

Hyla paramica differs from *Hyla jahni* in its rounded snout, less defined canthus and in lacking supratympanic fold, canthal, palpebral and supratympanic lines and closely set dark dots above.

The species is named after Dr. Alfredo Jahn, great student of the Venezuelan Páramos.

HYLA PLATYDACTYLA Boulenger

Hyla platydactyla Boulenger, 1905, Ann. Mag. Nat. Hist., (7) *16*: 183: Mérida, Andes of Venezuela; Lutz, A., Mem. Inst. Osw. Cruz, *20*: 39, 44.

No material examined.

Original Description. Head moderate, much depressed, a little broader than long; snout rounded, hardly as long as the orbit; nostrils near the tip of the snout; tongue subcircular, entire, slightly free behind; vomerine odontoids just behind the level of the moderately large choanae, in two slightly oblique series converging forwards; interorbital region a little broader than an upper eyelid; canthus rostralis distinct; loreal region very oblique, concave; tympanum rather indistinct, ⅓ the eye diameter; fingers much flattened, with a short basal web which extends as a fringe to the disks; toes short, much flattened, with a deeply notched web extending to the disks; latter about ½ the eye diameter; subarticular tubercles feeble; no tarsal fold; heel of the adpressed hind limb extends to the eye. Skin above, smooth. Below, belly and thighs granular. Male with a feebly developed, subgular vocal sac.

Color. Above, purplish, closely dotted with darker; upper surfaces of the arms and thighs white, with a median stripe of closely set, dark purple dots. Below, white.

Measurements. Snout-vent 32.

Remarks. This species seems to be very distinctively colored. It appears to be of a uniform light color, densely mottled with darker; between mottlings, the light ground color can be seen especially on the flanks and limbs. On the hand and foot, the dark color is limited to the outer digits, giving the impression of the situation in *Phyllomedusa*.

Hyla platydactyla is of approximately the same size as *Hyla jahni* and *Hyla paramica* and occurs in the same general area as these two species. It differs from *Hyla jahni* in the shorter snout and less defined canthus, absence of a light canthal and supratympanic line, narrower interorbital space, more vertical loreal region and different coloration. From *Hyla paramica* it can be differentiated by its longer snout, more oblique loreal region, absence of a pollex rudiment (not described or shown in photograph) and different coloration. It is also said to be allied to *Hyla vilsoniana* Cope (Boulenger, 1905).

I owe to Mr. J. C. Battersby the comparison of a photograph of *Hyla jahni* with the type of *Hyla platydactyla* and to Miss A. G. C. Grandison the photographs of the type specimen shown here. All remarks are based on this photograph and on the description of the species.

HYLA BENITEZI sp. n.

Figure 9

Type. Museum of Comparative Zoology No. 28564, a ♂ from Caño Wanadi, Mt. Marahuaca, Territorio Amazonas. Coll. J. A. Rivero, 20 May 1950.

Diagnosis. A medium sized *Hyla* with adherent tongue, vomerine teeth forming a / \ figure between the choanae; tympanum small, indistinct; an external rudiment of pollex; outer finger with 2⅔ free phalanges; largest disks larger than the tympanum and orange ventral coloration in life.

Description. Snout subovoid; tongue circular, adherent and nicked behind; vomerine odontoids forming a / \ figure between the moderate, oval, choanae, their anterior extremities extending to about the middle of the oblique inner margin of the latter; eye diameter more or less equal to distance between eye and nostril; interorbital space slightly broader than an upper eyelid; canthus indistinct; loreal sloping, slightly concave; tympanum very small and indistinct, ⅓ the eye diameter; an external rudiment of pollex; first finger shorter than second; outer three fingers with a short basal web; disks moderate but larger than the tympanum; subarticular tubercles small, rounded; an elongated, flat and indistinct inner metatarsal tubercle but no outer; toes fully webbed with the exception of the fourth where about two phalanges are left free; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth; below, finely granular. Male with a slight subgular vocal sac.

Color. Above and on the limbs brown, with darker brown transverse bars of varying width. Ventral surfaces including the limbs bright orange (in life) or white (alcohol after formalin). The inner fingers and toes and the webs were also orange above.

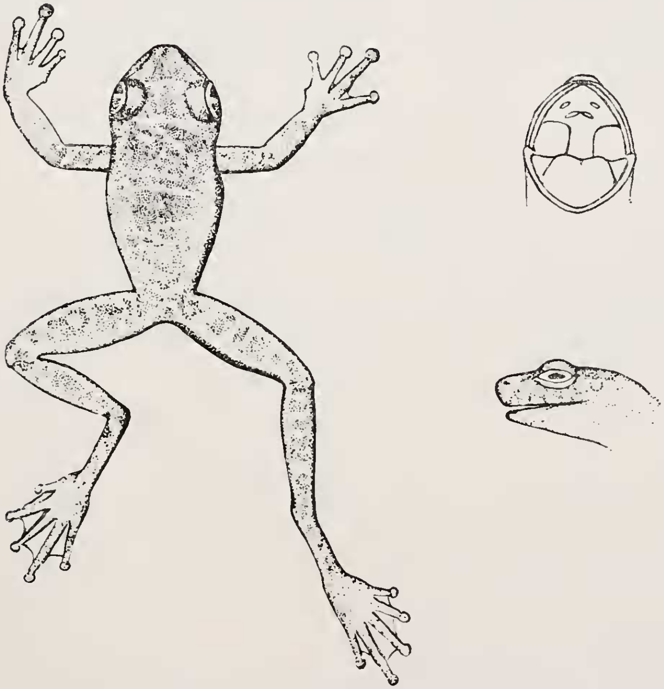

Fig. 9. *Hyla benitezi* sp. n. Type M.C.Z. 28564.

Measurements. ♂ Snout-vent 37; head breadth 13.5; head length 12; femur 16; tibia 18.5.

Habits. Both type and paratype were collected on the leaves of a dwarf palm that thrives on the stones of mountain stream rapids. The voice is heard sporadically at night but due to the uproar of the water, their localization is very difficult and their collection in the inaccessible places from which they call generally impossible.

Remarks. This form is quite different from anything known in Venezuela or from material of northern South America available to the author for comparison.

Morphologically, the only paratype is almost identical with the type but differs from it in coloration.

U.P.R. 145, a ♂ from Caño Wanadi, Mt. Marahuaca. Coll. J. A. Rivero, May, 1950. Snout-vent 36; head breadth 13.5; head length 12.5; femur 16; tibia 19. Color above, grayish brown with very obscure, slightly darker spots on the body and reticulations on the head. The tympanum is probably less distinct than in the type and the openings of the Eustachian tubes smaller.

HYLA MARAHUAQUENSIS sp. n.

Figure 10

Type. Museum of Comparative Zoology No. 28566, a ♂ (?) from Caño Cajú, Mt. Marahuaca, Territorio Amazonas. Coll. J. A. Rivero, May 1950.

Diagnosis. A small *Hyla* with physiognomy of *Eleutherodactylus;* transverse vomerine teeth between the choanae; fingers webbed; first finger longer than second; heel extending to the nostril; very peculiar dorsal coloration.

Description. Snout rounded; tongue oval, slightly free and nicked behind; vomerine odontoids in two juxtaposed, transverse groups between the moderate, oval choanae; eye diameter equal to distance between eye and nostril; interorbital space slightly convex, as broad as an upper eyelid; canthus moderate; loreal moderately oblique, concave; tympanum large, ½ the eye diameter; an indistinct supratympanic fold from lower eyelid to shoulder; fingers long and slender, free, the first longer than the second but shorter than fourth; two small metacarpal tubercles; subarticular tubercles well defined, rounded; largest disks about ½ the size of the tympanum; a small inner metatarsal tubercle but no outer; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 2, 2, 3⅔, 2¼; hind limbs long and slender; heel of the adpressed hind limb extends to the nostril. Skin above smooth; granular on the loreal and temporal regions; rugose on the upper eyelids. Ventral surfaces of the body and thighs finely granular.

Color. Above, brown, this color bounded by a pair of dorsolateral lines that cross the black upper eyelids and meet in a posteriorly directed notch in the interorbital space; snout lighter than the dorsal color enclosed by the dorsolateral lines; a small black spot behind the nostril; upper lip with light vertical bars; three dark spots on the dorsum in front of the sacrum, one in the middle of the back and one on each side just below the dorsolateral line; behind these, other more diffuse spots occur in succession; limbs yellowish brown streaked with darker brown; flanks of the same color as the limbs but uniform below the already described spots. Ventral surfaces dirty white.

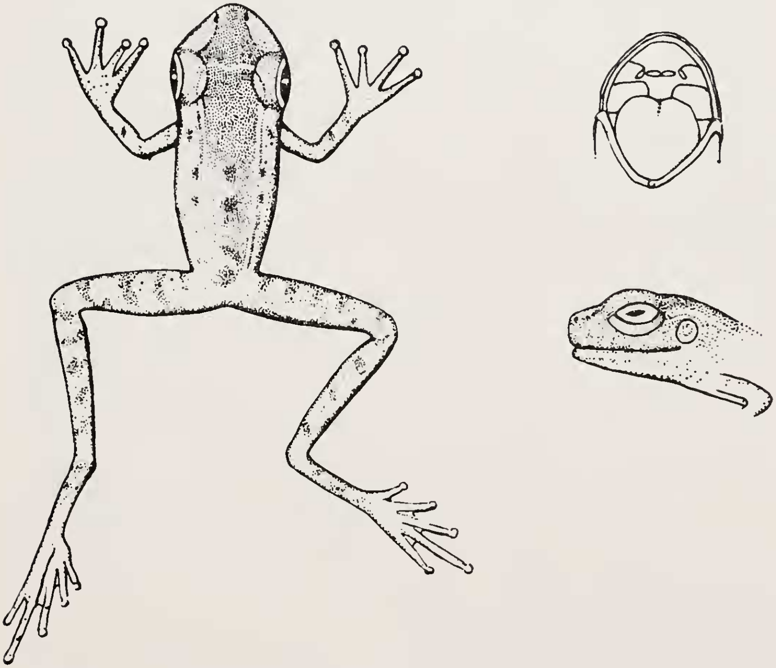

Fig. 10. *Hyla marahuaquensis* sp. n. Type M.C.Z. 28566.

Measurements. ♂ ? Snout-vent 27; head breadth 10; head length 10.5; femur 14; tibia 15.9.

Remarks. This specimen was thought to be an *Eleutherodactylus* until its true affinities were revealed by the position of its vomerine teeth, the expanded sacral diapophysis, the presence of claw-shaped terminal phalanges and intercalary disks. It is, however, a very peculiar frog whose allocation to the genus *Hyla* may be considered provisional.

It differs from all Venezuelan *Hyla* in having the first finger longer than the second and in this respect it agrees more with *Gastrotheca,* a genus in which it will perhaps eventually be placed.

HYLA RUBRA Laurenti

Hyla rubra Laurenti, 1768, Syn. Rept.: 35: America; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 45; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 43.

1 (U.P.R. 152) Sn. Fdo. de Atabapo, vi.50.

Description. Snout long, subovoid; tongue oval, adherent and indistinctly nicked behind; vomerine odontoids in two short, transverse groups between the moderate, oval, choanae; eye diameter shorter than distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus rounded, indistinct; loreal moderately oblique, slightly concave; tympanum distinct, about ¾ the eye diameter; a flat, indistinct supratympanic fold; no external rudiment of pollex; subarticular tubercles small; fingers free, the first shorter than second; larger disks about ½ the size of the tympanum; two small metatarsal tubercles; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1, 1½, 2, 1; heel of the adpressed hind limb extends to the eye. Skin above, with small granules on the head and scapular region; flanks granular; throat granular. Male with a slight, subgular vocal sac.

Color. Above, very dark gray, almost black; limbs lighter than the body color; flanks, anterior part of the thighs, and ventroposterior part of the tibiae obscurely mottled with light; a broad but short longitudinal white line along the posterior part of the thigh. Ventral surfaces dirty white.

Measurements. ♂ Snout-vent 41; head breadth 12.5; head length 14; femur 16; tibia 20.

Additional Localities. Caracas (Boettger, 1892); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana and the Coastal Range. Central America through Colombia to Bolivia on the west and British Guiana to Bahia on the east. Boulenger (1882) records it from Uruguay, and Cei (1956) cites Mirando Ribeiro as including Argentina within the range of the species. Cochran (1955) does not include it in the fauna of S. Brasil.

Remarks. The San Fernando specimen is large for the species and its very dark color is different from any specimen of *Hyla rubra* I have seen. It agrees with *H. rubra,* however, in all structural characters and the markings that are usually shown on the limbs of *H. rubra* are present, though obscure, in the San Fernando example. The white line on the thighs appears to be a longitudinal expansion of a spot and perhaps does not have any importance.

An M.C.Z. specimen from Central America, and another from Pará, Brasil, exhibit very peculiar spotting all over the dorsum. A group from Barana Dist., British Guiana, shows rounded snouts (in cross-section) which are much elevated between the eyes and in the intercanthal region. Probably *H. rubra* as known today represents a composite of several related forms.

In several museums, specimens of *Hyla columbiana* Bttgr. are confused with *Hyla rubra.*

Hyla rubra x-signata Müller, 1927, *H. rubra hübneri* Melin, *H. rubra inconspicua* Melin and *H. rubra duartei* Lutz, B., have been described from different localities. I have preferred to use the binomial until the whole species is studied and its components segregated.

Hyla boulengeri (Cope)

Scytopis boulengeri Cope, 1887, Bull. U.S. Nat. Mus., *32*: 12: Nicaragua.
?*Hyla acuminata* Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 43.
Hyla boulengeri Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.
?*Hyla palpebrogranulata* Lutz, A. (not Andersson), 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44, pl. XI, fig. 20, 20a.
Hyla boulengeri Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 537.

1 (M.C.Z. 12888) Bejuma, nr. Río Montero, ii.20.
1 (M.C.Z. 25984) Paují, iv.45.
1 (U.M.M.Z. 55828) Aroa.
1 (U.M.M.Z. 55829) Río Bejuma.

Description. Snout subacuminate, projecting beyond the mouth; tongue cordiform, free and nicked behind; vomerine odontoids in two short, transverse groups between the large, oval choanae; eye diameter shorter than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus indistinct; loreal oblique and concave; tympanum ⅔ the eye diameter; no rudiment of pollex; subarticular tubercles rather small; fingers free, their disks transversely oval and about ½ the size of the tympanum; no tarsal fold; metatarsal tubercles small; toes taken in order from first to fifth exhibit the following phalanges free of web: almost all, 1, 1¼, 2½ to 3, 1; head of the adpressed hind limb extends to the tip of the snout. Skin above, mostly smooth. Male with a subgular vocal sac.

Color. Above, brown with a triangular spot between the eyes that is occasionally light margined; a few, small, dark spots on the anterolateral part of the dorsum; thighs with a longitudinal brown band above and black transverse bars in front and behind it; on reaching the longitudinal band, the transverse bars assume a much lighter color; space between the bars pinkish red (alive); hidden part of the tarsus and upper part of the foot rose and black spotted; rest of the limbs uniform or with wide transverse spots. Below, grayish or dirty white; vocal sac generally infuscate.

Measurements. Snout-vent ♂ 34, ♀ 58.5; head breadth ♂ 11, ♀ 16; head length ♂ 12.5, ♀ 16; femur ♂ 18, ♀ 24; tibia ♂ 21.5, ♀ 30.

Habits. The Puerto Ayacucho specimens were collected while calling from tall grass in an inundated area.

Additional Localities. Maracay (Lutz, 1927); Orinoco R., below mouth of Caroní (M.C.Z. 19919); Orinoco R., nr. mouth Caño Horobopo (?) (M.C.Z. 19920); Puerto Ayacucho (U.P.R. 132-8).

Range. The Venezuelan Guayana and the Coastal Range. Central America, Colombia and British Guiana.

Remarks. It is possible that the specimens from northern Venezuela are different from those of Central America. A topotypical specimen examined (M.C.Z. 4896) has distinct tubercles on the head and anterior part of the body, the heel extends to between eye and nostril and the bars on the thighs cross this limb segment above without losing their color or being interrupted by the median longitudinal band. There are also black spots (and probably reddish ones) on the groins and posterior part of the flanks. The material from Puerto Ayacucho also looks different from that of northern Venezuela and Nicaragua but possibly this is because all of the Puerto Ayacucho specimens are males while the others are mostly females. They are very rugose above; the heel reaches between eye and nostril; the thigh bars are very well defined and not confluent and irregular as in the individuals from the north; the head looks much narrower; the toes are slightly less webbed and the color above is dark gray, without dorsolateral spots.

I have placed *Hyla palpebrogranulata* Lutz in the synonymy of this species pending further investigation. According to Andersson, who is the author of *Hyla palpebrogranulata,* this species "agrees most nearly with *Hyla phrynoderma* Boulenger and with *Hyla verrucigera* Werner and the related species of this one, *H. buckleyi* Gthr. and *H. leprieurii* Blgr." As the last two forms are different and unrelated to *H. phrynoderma,* the comparison makes one feel uncertain as to the appearance of this frog. Mr. Shreve has called to my attention that *H. phrynoderma* Blgr., 1889, is probably a synonym of *H. acuminata* Cope, 1862; and *H. acuminata* Blgr., 1882, a synonym of *H. boulengeri.*

It also appears that *Hyla acuminata* Lutz, which was perhaps identified by using Boulenger's catalogue, is also a synonym of *Hyla boulengeri.* However, I have placed it in the synonymy with some misgivings, for in referring to that species, Lutz speaks of two vocal sacs in the male, a peculiarity that is only found in *Hyla tibiatrix* among the *Hyla* reported from the Coastal Range. I doubt, however, that Lutz could have confused *H. tibiatrix* with *H. acuminata.*

Hyla palpebrogranulata Andersson also seems to be a synonym of *H. acuminata* Cope, but the figure of this species shown by Lutz apparently belongs to *H. boulengeri.* The animal is represented with a pointed snout tip such as is found in Miranda Ribeiro's *Garbeana garbei,* a form which is probably conspecific with *H. boulengeri.*

Lutz also mentions *Hyla boulengeri* in his report, but this is based on material that was not examined by him. The specimens he collected were apparently given only two names: *acuminata* and *palpebrogranulata.*

HYLA BAUMGARDNERI sp. n.

Type. Museum of Comparative Zoology No. 28563, a ♂ from Casa de Julián, Territorio Amazonas. Coll. J. A. Rivero, 26 May, 1950.

Diagnosis. A small *Hyla* of the *rubra* group with flat head; almost transverse vomerine teeth between the choanae; adherent tongue; tympanum ½ the eye diameter; fingers free; no rudiment of pollex; short hind limbs and chlorine green color in life.

Description. Snout flat above, subovoid; tongue oval, nicked and very slightly free behind; vomerine odontoids in two short, transverse groups between the small choanae; eye diameter equal to distance between eye and nostril; interorbital space a little broader than an upper eyelid; canthus rounded, indistinct; loreal scarcely oblique, flat; tympanum small but distinct, about ½ the eye diameter; a slight supratympanic fold; metacarpal tubercles indistinct; no external rudiment of pollex; fingers free, their disks almost as large as the tympanum; a small, oval inner and an indistinct outer metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: almost free, 1¾, 1½, 2¾, 1; heel of the adpressed hind limb extends to the eye. Skin above, smooth except on the head, snout, and upper eyelids where it is sparsely granular; a fold across the chest. A large subgular vocal sac.

Color. Above, chlorine green (in life) or yellowish gray (alcohol after formalin); canthus and supratympanic fold slightly darker than the rest of the head but with no well defined streak. Below, greenish yellow (in life) or grayish white.

Measurements. ♂ Snout-vent 29; head breadth 9; head length 9.5; femur 11.5; tibia 13.5.

Habits. The type and U.P.R. 184 were collected at night while calling from shrubs at about 5 ft. from the ground. There was a stream running over a granite bed (see *Leptodactylus rugosus*) at some twenty feet away and as it was raining considerably at that moment, most of the ground under the shrubs was inundated. Most of the La Culebra specimens came from tall grass (savanna) in an inundated area but one was taken in a thatched roof at about 1:00 A.M. The noise made by the frog was so annoying that those trying to sleep beneath the thatch united to catch the intruder. The voice is a cicada-like "crrrr" that may continue without interruption for several minutes.

Two pairs of specimens were in amplexus on grass blades about two feet from the water.

Remarks. Except for a slight variation in the amount of web and other characters mentioned below, the paratypes agree in all essentials with the type.

Among the paratypes there are two females (U.P.R. 149, 179) both collected at La Culebra, 1,000 ft., and having a snout-vent length of 32 and 29.5 mm., respectively. The other paratypes were taken at Casa de Julián (U.P.R. 184), La Culebra (U.P.R. 150-1, 176-8, 181-2) and Puerto Ayacucho (U.P.R. 180). Except for specimen No. 180 which is smaller than usual (22.5 mm.) and has a more pointed snout, there is no great variation among the members of the group. A triangular interorbital spot may be present or absent.

This species is very similar to the Panamanian *H. altae* Dunn (= *H. staufferi, fide* Taylor, 1952) and both are so similar to *H. rubra* that they might be mistaken for juveniles. *H. baumgardneri* is, however, distinguished from the type of *Hyla altae* by its flatter, granular snout which does not project beyond the mouth, probably larger size (type of *altae*, 23 mm.), different coloration, and probably different voice. As in *H. rubra*, *H. altae* has two curved longitudinal lines on the dorsum from behind the eyelids to groin, and the basic color is light brown. A cross-section of the snout of *H. altae* would be semicircular (as in British Guianan *H. rubra*) and the voice, as described by Dunn, is a harsh "whark." Dr. Dunn explains, however (letter, 14.4.51), that the Panamanian frogs were calling with so many others, that there is a distinct possibility the cries may have been confused.

From *Hyla rubra*, *Hyla baumgardneri* differs in its smaller size, shorter snout, smaller tympanum, darkened eyelids and different coloration.

HYLA LUTEOCELLATA ROUX

Hyla luteo-ocellata Roux, 1927, Verhandl. Naturf. Ges. Basel., *38*: 260: El Mene, Prov. Falcón, Venezuela.

No material examined.

Original Description. Head somewhat broader than long; snout short, scarcely longer than the orbital diameter; nostrils near the tip of the snout; tongue oval, broader than long, entire and slightly free behind; vomerine odontoids in two small groups between the choanae; eyes large, protuberant; interorbital space twice as broad as an upper eyelid; canthus moderate; loreal high, slightly oblique; tympanum hidden; second finger shorter than fourth; digits webbed at the base only; disks large; hind limbs long; an outer, oval, metatarsal tubercle; subarticular tubercles rounded and rather small; toes ⅔ webbed; last two phalanges of the fourth toe free; disks of the toes equal to those of the fingers. Skin above, smooth. Below, throat and breast smooth; a fold across the chest; belly reticulate and widely granular.

Color. Above, grayish brown merging into light gray on the sides and sprinkled on the trunk and head with small, black spots; a more or less distinct brown band between the eyes; a narrow light line, commencing at the tip of the snout, follows the canthus rostralis and continues behind the eye, bordering the light dorsolateral region below; loreal region with a dark brown band that extends to the side of the body passing over the forelimb; a white spot on the hind part of the flanks; a white (yellow in the living animal?) spot below the eye is surrounded with brown and extends to the lower jaw; inner aspect of the thigh occupied by a large, elongated-oval, white-margined, black spot; upper surfaces of the thighs light brown with more or less rounded white or yellowish spots; tibia grayish above, showing a light elongated spot on its lower surface near the articulation with the thigh; tarsum speckled with white and gray. Belly whitish; throat with some brown spots.

Measurements. ♂ Snout-vent 31; hind limb 32.

Remarks. The species is only known from the two male individuals described by Roux. It is well characterized, however, and not likely to be confused with any other Venezuelan *Hyla*.

HYLA MARMORATA MARMORATA (Laurenti)

Bufo marmoratus Laurenti, 1768, Syn. Rept.: 29: Surinam.

4 (U.P.R. 126-9) Sn. Fdo. de Atabapo, vi.50.

Description. Snout short, almost semicircular, equal or slightly longer than the eye diameter; tongue subcircular, a little free and nicked behind; vomerine odontoids in two short, transverse and juxtaposed groups between the small, round choanae; interorbital space more or less equal to an upper eyelid; canthus rounded; loreal little oblique and convex; tympanum distinct, ½ to ⅔ the eye diameter; a loose fold of skin from elbow to flanks and an external fringe from elbow to disk of last finger; no rudiment of pollex; subarticular tubercles flat; fingers depressed, exhibiting the following phalanges free of web: 1½, 1, 2, 1; the web extends to the disks as distinct lateral fringes; disks almost as large as the tympanum; a festooned, lateral fringe from knee to disk of outer toe; two metatarsal tubercles, the outer, small and inconspicuous, the inner oval and prominent; toes fully webbed with the exception of the fourth where 1½ to 2 phalanges are left free; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the eye. Skin above, mostly smooth. Male with an external subgular vocal sac.

Color. Above, grayish brown, marbled with darker tones of brown; a light, hour-glass marking between the eyes, broadened anteriorly at the snout; anterior and posterior parts of the thighs orange (whitish in alcohol) with a few dark, well defined spots; a longitudinal streak of different shades of brown along the upper part of the thighs; tibial segment with dark, transverse spots on a lighter brown background. Below: throat, belly and ventral surface of thighs orange, with numerous small, black spots; lower lip dotted with white; tibiae, tarsi and toes black; web of fingers and toes orange and black.

Measurements. ♂ Snout-vent 35; head breadth 11; head length 10; femur 15; tibia 11.

Habits. The four males were collected, while calling, from the leaves of a bush near a rain pool. Surrounding area, savanna.

Range. The Venezuelan Guayana. The species extends from the Guianas to Brasil (Angra dos Reis), Perú and Bolivia. *Hyla melanargyrea* and *Hyla senicula*, now considered races of *marmorata*, were described from Matto Grosso (headwaters of Xingú) and Río Napo or Upper Marañón, respectively.

Remarks. The color recorded was based on observations made on a living frog at night with the aid of a flashlight. It is possible that the orange may be actually red.

HYLA TIBIATRIX TIBIATRIX Laurenti

Hyla tibiatrix Laurenti, 1768, Syn. Rept.: 34 (type loc. not cited).

Hyla venulosa Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40; Stejneger, 1902, Proc. U.S. Nat. Mus., *24*: 180; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44, pl. xiv, figs. 33, 33a, b, c, 34; Röhl, E., 1948, Fauna Descr. de Ven., ed. 2: 401, fig. 181.

Hyla nigromaculata Boettger, 1895-6, Ber. Senckenb. Naturf. Ges.: LIV.

Phrynohyas zonata Duellman, 1956, Misc. Publ. Mus. Zool. Univ. Mich., No. 96: 35, pl. v, figs. 1, 2; pl. vi, figs. 1, 2.

2 (U.S.N.M. 22545, 27797) La Guaira, vii.02.
1 (U.S.N.M. 128792) Los Canales, v.39.
1 (U.S.N.M. 80612) nr. Carapa, x.29.
1 (U.S.N.M. 36377) Caicara, v.05.
2 (U.S.N.M. 117098-9) Caripito, 42.

Description. Snout short, rounded; tongue cordiform, slightly nicked and free behind; vomerine odontoids in two transverse groups between the moderate choanae; eye diameter shorter than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus rounded; loreal moderately sloping, concave; tympanum ⅔ to ¾ the eye diameter, its dorsal margin covered by a glandular fold that runs to the shoulder; a number of rounded glandules behind the angle of the mouth; no external rudiment of pollex; subarticular tubercles not large but prominent; first finger shorter than second; taken in order from first to fourth the fingers exhibit the following phalanges free of web: 2, 1½ to 1¾, 2½ to 3, 2; larger disks about the same size as the tympanum; a slight tarsal fold; toes exhibiting the following free phalanges: 1½ to 1⅔, 1 to 1¼, 1, 2 to 2½, 2 to 2¼; heel of the adpressed hind limb extends to the eye. Skin above, smooth, or more usually with scattered tubercles and warts; flanks glandular. Male with two vocal pouches at the angle of the mouth and a brown rugosity on the inner side of the first digit.

Color. Above, light brown, marbled, spotted or with undulating broad bands that form variable patterns; hind limbs crossbarred, mottled or dotted with dark brown; the crossbars, when present, are usually broad, with concave ends that enclose an almost circular light spot.

Measurements. Snout-vent ♂ 60.5, ♀ 76.5; head breadth ♂ 20.5, ♀ 25.5; head length ♂ 18.5, ♀ 21.5; femur ♂ 28.5, ♀ 34; tibia ♂ 29.5, ♀ 37.

Habits. Robinson (*in* Stejneger, 1902) describes the voice of this species as "A monotonous note like the bleating of a goat and fully as loud."

Additional Localities. Maracay (Lutz, 1927); La Guaira (Stejneger, 1902 [= U.S.N.M. 22545, 27797]); Maturín (Boettger, 1893).

Range. The Coastal Range, the eastern part of the Llanos (Caripito), the Delta and the Venezuelan Guayana. Central America to Bolivia (Procter, 1921) and from Trinidad and the Guianas to N. Brasil. Cochran (1955: 55) mentions its occurrence in Argentina; Peracca (1904) has reported the species from Paraguay. Duellman (1956) considers those from Minas Gerais, Paraguay and Argentina to represent *Phrynophyas hebes* (*Hyla hebes*).

Remarks. In 1956, in a comprehensive study of the frogs included under the name *Hyla venulosa*, Duellman suggests that the neotropical hylid frogs with two lateral vocal sacs situated behind the angle of the jaw, without a frontoparietal fontanelle, with free cranial skin and bifid maxillary teeth should be placed in the genus *Phrynohyas* of Fitzinger. He has split *Hyla venulosa* auct. into a number of species, two of which are represented in Venezuela. He uses the name *Phrynohyas ingens* for the form that occurs in the Maracaibo Basin and *Phrynohyas zonata* for the one that occurs in the Coastal Range and elsewhere in northern South America. He considers *Hyla tibiatrix* Laurenti a *nomen dubium* for the following reasons:[1]

1. *Hyla tibiatrix* Laurenti is based on Seba I. 71. 1-2 and this drawing may represent any of the forms comprised by *H. venulosa* auct.
2. The type locality given is America.
3. The figure in Seba shows no color pattern and it might possibly show a casqued head.

There does not seem to me to be much doubt regarding the identity of Seba's picture with *Hyla venulosa* auct. I believe the casque would have been mentioned if it existed and no reference is made to it; to me it does not appear that a casque is represented in the drawing.

In their paper of June 1951, Dunn and Stuart express themselves regarding the restriction of type localities. Re-wording articles 29 and 31 of the Laws of Nomenclature, they state that ". . . if a species is divided into two or more restricted species, its valid name must be retained for one of the restricted species" and further on ". . . the division of a species into two or more restricted species may automatically involve a concomitant selection or restriction of type localities as well as of type specimens . . ."

I believe it would have been much simpler and more convenient, to restrict the type locality rather than to consider *Hyla tibiatrix* a "*nomen dubium.*" As there are only three forms of the presently discussed *Phrynohyas* in South America, and of these, at least one is probably a race of another (according to Duellman, *hebes*, of S. Brasil, Argentina and Paraguay is perhaps a race of *zonata* of the north of South America), the third being restricted to the Maracaibo Basin, the probabilities are that Seba's drawing represents *zonata*. If we declare "*nomina dubia*" all the doubtful forms whose type locality is America, very many well known names of frogs and other animals will have to disappear from our nomenclature.

In trying to relate *Hyla taurina* with the *Phrynohyas* and other related groups, I ran into a few difficulties. *H. taurina* has bicuspid teeth, but this character is shared with *H. boans, H. raniceps, H. septentrionalis* and according to Noble (1931: 123) with most metamorphosed Amphibia. Cope (1865b: 108) included *Hyla taurina* (as *Osteocephalus*) among the frogs with a frontoparietal fontanelle, but in his "Batrachia of North America" (1889: 322) he rearranged his key and "*Osteocephalus*" fell among the hylids with no fontanelle. I have examined one specimen of this species, two of *H. boans* (*H. maxima* auct.) and one each of *H. raniceps, H. crepitans, H. rubra, H. acuminata* (*H. phrynoderma* auct.), *H. mesophaea, H. buckleyi, H. boulengeri, H. leprieurii, H. imitatrix* and *H. vilsoniana*. All the frogs having two lateral vocal sacs[1] (*taurina, mesophaea, buckleyi, leprieurii, imitatrix*) lacked the frontoparietal fontanelle, but there are four species, without lateral vocal sacs (*boans, rubra, acuminata, boulengeri*) in which a fontanelle could not be detected. *H. taurina* agrees with *H. venulosa* auct. (Duellman's *Phrynohyas*) in having a glandular skin (males) but in this respect it differs from *Hyla mesophaea* and most *H. imitatrix,* both of which on the other hand, have lateral vocal sacs and lack the frontoparietal fontanelle. If the characters of the skin and teeth are not considered for characterizing *Phrynohyas*, we are left with the lateral sacs, and the lack of fontanelle and of skin ossification to distinguish the group from other hylids.

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[1] In Bull. Zool. Nomencl., *12* (5), 1956, Duellman makes a form request to the International Commission to declare *H. tibiatrix* Laurenti a nomen dubium.

H. taurina agrees with *H. leprieurii* (with which it is very closely related) and *H. buckleyi* in the character of the vomerine teeth (╱‾ ‾╲-shaped in the first two, ╱╲-shaped in the latter), a character they share with *H. boans, H. geographica* and *H. crepitans* but not with *H. venulosa* auct., *H. imitatrix* and *H. mesophaea*. Is it possible that there are two groups of frogs with lateral vocal sacs and solid skull roof, each one of them having a different origin? This is only a possibility but one that cannot be discarded. Liu has expressed the opinion that "the evolution of the vocal sac does not always parallel the steps of the evolution of species or other groups, the exceptions being due to independent origin of the vocal sacs or to acceleration or retardation of evolution in this character" (1935: 29).

This discussion does not, by any means, prove that Duellman's conclusions are incorrect. It does prove, however, that a detailed study of related forms is an absolute necessity before establishing any generic or even subgeneric boundaries. Until such a study is made, the name *Hyla tibiatrix* is maintained for the species under consideration. The type locality is hereby restricted to Surinam.

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[1] Following the classification of Liu, 1935.

The lack of frontoparietal fontanelle in *H. boulengeri, H. rubra, H. phrynoderma* and perhaps in other *Hyla* of the *rubra* group suggests the need for further and more detailed study of these frogs, which are also characterized by lacking any web between the fingers.

Dr. Mertens informs me that the *Hyla nigromaculata* mentioned by Boettger in his 1895-6 report is really *Hyla tibiatrix.*

According to Röhl (1949) the common name of this frog in Venezuela is "rana lechera."

HYLA TIBIATRIX INGENS (Duellman)

Phrynohyas ingens Duellman, 1956, Misc. Publ. Mus. Zool. Univ. Mich., No. 96: 22, pl. ii, fig. 2.

1 (C.N.H.M. 2604) Orope, 08.
4 (U.M.M.Z. 55567-70) La Fría.
1 (U.M.M.Z. 57397) Sabana de Mendoza.

Description. *Hyla tibiatrix ingens* is distinguished from the typical form by having a more or less uniform color above (brown with darker brown dots, especially on the posterior half) and by its greater size and thicker, more glandular skin.

Measurements. ♀ snout-vent 105; head length 30; head breadth 33.5; femur 49.4; tibia 54.3.

Habits. The following paragraph is quoted from Duellman, who quotes from Baker: "Two pairs of these big frogs were copulating in a peccary wallow pond near a big tree. The male makes a loud noise like dropping a rock into a vessel partially filled with water. After heavy rains, eggs on surface (of water) formed films two or three feet across."

Range. The Maracaibo Basin.

Remarks. There is a 112.5 mm. female specimen at U.M.M.Z.

HYLA VILSONIANA MERIDENSIS ssp. n.

Hyla wilsoniana Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

Type. Museum of Comparative Zoology No. 2527, a ♀ from Mérida, 1630 m.

Diagnosis. *Hyla vilsoniana meridensis* differs from the typical form in having white spots or marbling on the posterior part of the thighs, flanks, axillae, underside of the hind limbs, hidden portions of the tibiae and tarsus and dorsal part of the foot.

Description. Snout short, rounded; tongue broad, ⅓ free and nicked behind; vomerine odontoids in two transverse groups between the round or oval choanae; eye diameter greater than distance between eye and nostril, but shorter than the snout; interorbital space slightly broader than an upper eyelid; canthus rounded, indistinct; loreal moderately oblique, not concave; tympanum ½ the eye diameter; a slight supratympanic fold; two faint metacarpal tubercles; one flat inner metatarsal tubercle but no outer; subarticular tubercles of fingers and toes moderate but rather flat; fingers with a short basal web, the first shorter than second; larger disks about the same size as the tympanum; toes taken in order from first to fifth exhibit the following phalanges free of web: 1, 1, 1⅓, 3, 1; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth. Below, with large and very distinctive flat granules; a transverse pectoral fold.

Color. Above, slate or bronze colored (said to be green, alive); axillae, groins, anterior and posterior aspects of the thighs, ventral portions of the tibiae, hidden portions of the tibiae and tarsus and dorsal part of the foot spotted with white. Below, yellowish orange (in life?) or slate, the granules lighter.

Measurements. ♀ Snout-vent 42; head breadth 13; head length 12.5; femur 18; tibia 20.

Additional Localities. Chama (U.S.N.M. 71114; U.M.M.Z. 3574; C.N.H.M. 3573-4); La Culata (A.M.N.H. 10671-3); Venezuela (A.M.N.H. 10666-7, 10669).

Range. The Subtropical Zone of the Mérida Andes.

Remarks. The eye is equal to distance between eye and nostril in a few specimens and in some the interorbital space is equal to an upper eyelid. The web may be 1¼, 1¼, 1½, 2⅞, 1¼.

Some frogs (A.M.N.H. 10671-3) are labeled "La Culata, N. W. Ecuador." My reasons for including the specimens here are as follows:

1. No place with such a name has been found in Ecuador.
2. *Hyla vilsoniana* has not been reported otherwise from Ecuador.
3. If *Hyla vilsoniana* does occur in Ecuador it is not likely to be on the western side of the Andes.
4. There is a place by the name of La Culata in Venezuela.
5. The specimens agree in all details with Venezuelan animals rather than with those from Colombia.
6. Specimens with approximately the same date and received from the same dealer were collected in La Culata, Venezuela.

Dunn (1944b: 72) has placed *H. vilsoniana* Cope in the synonomy of *H. labialis* Peters, 1863. Whether or not this is correct I am not prepared to say, but I am well aware of a large, *vilsoniana*-like frog that occurs in Gutierrez, Colombia. In some museums, specimens of this species are determined as *H. labialis*, while in others it is known as *H. gularis*. Three alternatives are possible:

1. That *H. gularis* is a distinct species while *H. vilsoniana* is a synonym of *H. labialis*.
2. That *H. gularis* is a synonym of *H. labialis* while *H. vilsoniana* is a distinct species.
3. That *H. labialis* is a distinct species while *H. gularis* is a synonym of *H. vilsoniana*.

As both forms are very similar and it is not possible to come to any conclusion without examining the types, I have decided for the present to use the name *vilsoniana* on the basis that in two cases out of three this should be the proper name to use.

All the 12 Venezuelan specimens examined show the characteristic spotting of the limbs that characterize the race. It is possible that differentiation of *H. v. meridensis* occurs at or near the Depression of San Cristóbal in Venezuela. Colombian specimens available for comparison (A.M.N.H. 16738-54, Bogotá, 5456-61, 53822-4, cotypes, nr. Bogotá; M.C.Z. 7299-7308, 20936-7, 24196, Bogotá and San Pedro, Antioquía) do not show any limb or flank spotting, except perhaps A.M.N.H. 53822, where there is some indication of it.

HYLA MINUTA Peters

Hyla minuta Peters, 1872, Monatsb. Akad. Wissensch. Berlin: 680: New Freiberg, Brasil.

14 (U.P.R. 153-66) Pto. Ayacucho, vi.50.
1 (U.P.R. 167) Sanariapo, vi.50.

Description. Snout short, almost semicircular, little longer than the eye diameter; tongue oval, slightly nicked and free behind; vomerine odontoids in two short, slightly oblique series between the round choanae, their posterior extremities directed inwards; eye diameter greater than distance between eye and nostril; interorbital space much broader than an upper eyelid; canthus rounded; loreal almost vertical, slightly convex; tympanum indistinct, partly covered by a loose supratympanic fold, about ½ the eye diameter; no external rudiment of pollex; subarticular tubercles small and indistinct; fingers taken in order from first to fourth exhibit the following phalanges free of web: almost all, 1⅓ to 1½, 2⅔, 2 to 2¼; disks small, about the same size as the tympanum; no tarsal fold; toes depressed, fully webbed except in the third and fourth where the membrane does not extend to the disks; disks of toes not much more expanded laterally than the width of the phalanges; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth; a fold across the chest; male with a very large, subgular vocal sac.

Color. Above, straw colored or yellowish brown with definite, light-margined, darker spots of irregular form and size. The spots are generally saddle or chevron-shaped, but hour-glass, triangular, or round ones are often found. The marginal lines are fine and of a golden or cream color, but spots without the marginal lines are sometimes present although apparently not in the same individual having the margined ones. Very few of the specimens are uniformly brownish or grayish. A small transverse line at the anus and a short, longitudinal one along the heel seem to be constant characters. The thighs are uniformly colored, the rest of the hind limbs generally marked with light margined spots; forelimbs equally marked. Ventral surfaces immaculate.

Measurements. Snout-vent ♂ 23, ♀ 26; head breadth ♂ 8, ♀ 8.9; head length ♂ 7.5, ♀ 8; femur ♂ 11, ♀ 11; tibia ♂ 12.5, ♀ 12.

Habits. Hundreds of these frogs were seen in a shallow inundated area between Puerto Ayacucho and Sanariapo. All were males, however, and upon returning to the place two nights later, the animals had deserted and no eggs were found. Most of the frogs were calling from grass blades or from the water, which was not deeper than their bodies. The pool was actually in a grassland but there was high forest some yards to the east and west.

In Marahuaca, collecting was carried out in a similar situation but the forest at this place was heavy and very humid.

Additional Localities. Temiche (U.P.R. 169-75, 260-262).

Range. The Venezuelan Guayana. Trinidad and the Guianas to southern Brasil.

Remarks. The specimens from Temiche are smaller, much darker, and lack the ornamental coloration of the lowland group. Probably they should be given a racial name.

Specimens from Río de Janeiro are also smaller and probably slightly less webbed than the animals from Puerto Ayacucho.

HYLA MISERA Werner

Hyla misera Werner, 1903, Zool. Anz., *26*: 252: Caracas, Venezuela; Nieden, 1923, Das Tierreich. Anura, I: 263; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 43, pl. xi, fig. 16 and pl. xv, fig. 37.

1 (M.C.Z. 26150) Cerro Cosme, x.39.

Description. Head as broad as long; snout short, rounded, slightly longer than the eye diameter; tongue rounded, nicked and slightly free behind; vomerine odontoids in two short, slightly oblique groups between the moderate choanae, their posterior extremities directed inwards; eye diameter greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus indistinct; loreal slightly oblique, not concave; tympanum not very distinct, little less than ½ the eye diameter; subarticular tubercles of fingers and toes not very distinct; fingers short, taken in order from first to fourth they exhibit the following phalanges free of web: all, 1½, 2½, ½; a tarsal fold; one small, oval inner, but no outer, metatarsal tubercle; toes fully webbed, except for the third and fourth in which the web does not extend beyond the penultimate articulation; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above smooth. Male with a subgular vocal sac.

Color. Above, brown with obscure longitudinal markings of darker color and dark punctuations under a lens; a dark canthal streak. Below, light brown.

Measurements. ♂ Snout-vent 20; head breadth 6.2; head length 6.2; femur 10; tibia 11.

Additional Localities. Caracas (Nieden, 1923 = Werner, 1903?); Caracas and Maracay (Lutz, 1927); Kunana, Perijá Mts. (Alemán, 1953).

Range. The Falcón Region and the Coastal Range, and the Parijá Mts.

Remarks. This form is rather similar to *Hyla minuta,* from which it can be distinguished by its smaller size, straighter loreal region, distinct tarsal fold and less ornate coloration as well as by the lack of the anal and heel lines that are present in *minuta.*

The Venezuelan specimen differs from the original description and from Colombia (M.C.Z. 16077, Tucurinca; M.C.Z. 13751-3, Sevilla) and Trinidad material (M.C.Z. 17809-17900, St. Augustine) in lacking the very distinct darker coloration of the loreal region and flanks. The Trinidad and Colombian animals, which look identical to me, have a white line that extends from tip of the snout, over the outer margin of the upper eyelid to the sacral region or beyond. This may have existed in the Venezuelan example but its presence is not evident in the present condition of the animal.

Hyla misera is closely related to *Hyla microcephala,* from which it is distinguished by lacking the well defined dorsal pattern of the latter (present but very faintly indicated in preserved *H. misera*). The dark lateral coloration and the dorsolateral white line that divide the dorsal and ventral colors of *misera* are present in *microcephala,* but the lateral color does not seem to extend as far down ventrally as in *misera.*

In northeastern Colombia, *H. misera* is found as far west as west of Sierra de Santa Marta, and it has been recently collected by Alemán at the Perijá Range of Venezuela. It seems that *H. microcephala* meets *misera* somewhere in the Magdalena Valley and that the latter is only a race of *microcephala.* Until a more complete examination of material is made, I have preferred to continue using the binomial.

Several races of *Hyla microcephala* have been described from Central America.

Hyla orophila planicola Lutz and Lutz

Hyla (*Sphoenohyla*) *planicola* Lutz, A. and B., 1938, Ann. Acad. Bras. Sci., *10*: 182: Recreio dos Bandeirantes, Federal District, Brasil.

1 (M.C.Z. 19917) Orinoco R., below Barrancas, ii.35.

Description. Head small, flat; snout short, rounded at the tip and projecting beyond the mouth; tongue cordiform, slightly indented and free behind; vomerine odontoids almost imperceptible, probably in two round groups behind and between the small, round choanae; eye small, not protruding, its diameter equal to distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus apparently well defined; loreal vertical, not concave; tympanum not very distinct, ½ the eye diameter; no projecting external rudiment of pollex, but a fairly distinct tubercle at the base of the first finger; subarticular tubercles indistinct; first finger much shorter than second; taken in order from first to fourth, the fingers exhibit the following phalanges free of web: 2, 1, 2, 1½; largest disks about as large as the tympanum; an oval, inner metatarsal tubercle; toes fully webbed, with the exception of the fourth where two phalanges are left free; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, shagreened;

a pair of horizontal flaps at the sides of the anus. Male with an external vocal sac.

Color. Above and below, yellowish white; a light brown canthal streak.

Measurements. ♂ snout-vent 24; head breadth 7; head length 6.8; femur 11.5; tibia 12.

Range. In Venezuela known only from this specimen. British Guiana to Bolivia and southern Brasil. *Hyla orophila orophila* occurs in the mountains of southern Brasil while *Hyla orophila planicola* is restricted to the lowland. These as well as *Hyla aurantiaca surda* Cochran, from Paraná, are considered separate species by Goin (1957).

Remarks. The Venezuelan individual has slightly more webbing on the toes than animals from southern Brasil. The snout is also blunt, instead of triangular and pointed, but this is probably because it has received a blow in front. The almost total absence of vomerine teeth in this specimen is probably an abnormality. Since it has a distinct tympanum it cannot be considered as a specimen of *Hyla habra* (Goin).

Hyla aurantiaca Daudin, 1803, is preoccupied by *Hyla aurantiaca* Laurenti, 1768. This latter is based on Seba *I*, plate 71.3 which was used for the description of *Hyla boans.* Therefore, I use the name *Hyla orophila* Lutz and Lutz for the species hitherto known as *Hyla aurantiaca* Daudin.

Goin, 1957, erects the genus *Sphoenohyla*[1] for the group of frogs comprising *Hyla orophila,* on the basis of a different vocal sac, a backward projecting process in the ischium, and probable different habits. In trying to put boundaries to the genus, I dissected a few frogs, not only from South America, but also the Old World *H. arborea*, the genotype of *Hyla*, and *H. aurea* from Australia. These two show a rounded ischium, more or less as figured for the North American *H. cinerea* (Goin, 1957: 14, fig. 2), but *Hyla rubra* and to a greater extent *Hyla crepitans* show a dorsal, posterior projection as figured for *Sphoenohyla aurantiaca* (Goin, *op. cit.*). In *Hyla tibiatrix* and *H. brunnea* (Jamaica) the ischium is more extensive posteriorly than in the European or Australian frogs, but there is no notch or indentation to divide the bone into dorsal and ventral projections. If the character of the ischium is to be taken as generic, perhaps all the South American *Hyla* can be separated from the others into a different genus.

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[1] Created as a subgenus by Lutz and Lutz, 1938.

Liu, 1935, classifies the vocal sacs into median subgular (internal or external), paired subgular (internal or external), and paired lateral (internal or external). According to him (*op. cit.*, pp. 33-35), all these, except the paired subgular external, are represented in the genus *Hyla*. In two species, the vocal sacs are totally absent. *Hyla aurantiaca* auct. was not studied, but *Hyla nana*, considered by Goin of the *Sphoenohyla* group, shares a median, subgular external sac with 59 of the 88 species mentioned. In comparing *Sphoenohyla* with *Hyla*, Goin does not mention what species he has compared. However, considering the different vocal sacs that are known to occur within the genus as presently known, I do not think it wise to accept the separation of *Sphoenohyla*, especially since the character of the ischium is not apparently an exclusive character of the group.

HYLA BATTERSBYI sp. n.

Figure 11

Hyla leucomelas Günther (not Duméril and Bibron), 1858, Cat. Batr. Sal. Brit. Mus.: 110: Caracas.

Type. British Museum of Natural History No. 53.2.4.165, a ♂ from Caracas, Venezuela.

Diagnosis. A *Hyla* with transverse vomerine odontoids; well defined tympanum, about ½ the eye diameter; no external rudiment of pollex; ⅓ webbed fingers and grayish color minutely dotted with reddish brown on all the upper and lower surfaces except the forelimbs and belly.

Description. Snout rounded; tongue circular, entire and adherent; vomerine odontoids in two transverse, juxtaposed groups on level with the posterior margins of the small, round choanae; eye diameter equal to distance between eye and nostril; interorbital space somewhat broader than an upper eyelid; canthus moderate; loreal very slightly oblique, concave; tympanum well defined, about ½ the eye diameter; a supratympanic fold; no external rudiment of pollex; first finger shorter than second; subarticular tubercles rounded, distinct; fingers taken in order from first to fourth exhibit the following phalanges free of web: practically all, 1⅞, 2½, 2½; larger disks as large as the tympanum; an almost imperceptible tarsal fold; one internal, oval metatarsal tubercle; toes exhibiting the following free phalanges: 1¾, 1⅕, 1¼, 2 to 2½, 1½; heel of the adpressed hind limb extends to between eye and nostril. Skin above smooth, below granular on the belly and thighs; a transverse pectoral fold; male with a slight subgular vocal sac.

Color. Above, light brown with numerous small but sharply defined reddish brown dots that appear more profusely on the top and sides of the head, flanks and limbs; a dark canthal and supratympanic streak; loreal whitish with dark dots; limbs crossbarred. Belly, ventral surface of forelimbs and granular ventral part of the hind limbs uniformly light brownish, the rest of the hind limbs and the throat minutely dotted; a pair of callous, white spots on the buttocks.

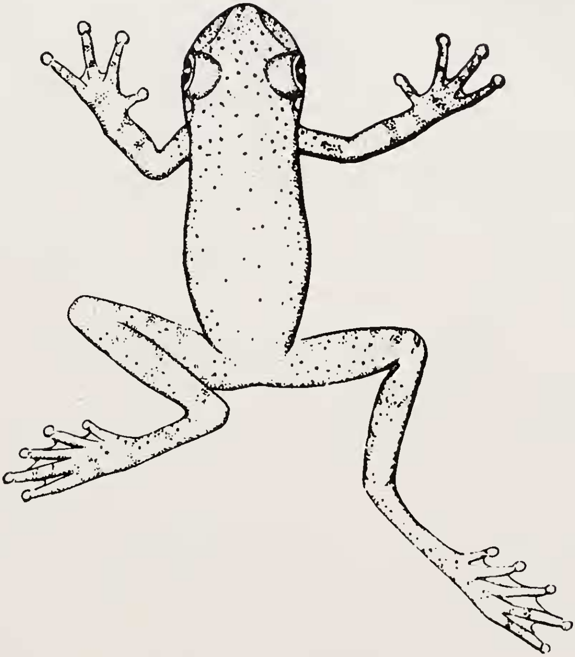

Fig. 11. *Hyla battersbyi* sp. n. Type BM (NH) 53.2.4.165.

Measurements. ♂ Snout-vent 33, head breadth 10.5; head length 10.5; femur 17; tibia 17.

Remarks. In the dotting of its body surfaces this species agrees somewhat with *Hyla rufopunctata* Andersson, *Hyla aluminiata* Andersson (which may be the young of something else), *Hyla palmeri* Blgr., *Hyla festae* Peracca, *Hyla albida* Melin, *Hyla phyllognatha* Melin, *Hyla columbiana* Bttgr. and the young of

Hyla geographica Spix. From the first two and the young *Hyla geographica* it differs in the well exposed tympanum and in the different position of the vomerine odontoids, from *H. palmeri* and *H. festae* in the form of the odontoids, slighter inclination of the loreal region, amount of webbing, smoothness of the skin, and in having shorter legs, smaller size and different coloration than *festae*. From *H. albida* it can be rapidly distinguished by the visible tympanum, adherent tongue, lack of external rudiment of pollex, etc., and from *H. phyllognatha* by the size of the tympanum, position of the vomerine odontoids, amount of webbing, lack of external rudiment of pollex and other characters. With *Hyla columbiana* Boettger, this species agrees in several characters but it can also be readily differentiated by its well defined tympanum, completely adherent tongue and different coloration of the ventral surfaces. While *H. battersbyi* is profusely dotted on the throat and ventral surface of the hind limbs, *Hyla columbiana* is uniformly colored on these regions or more usually, distinctly variegated or marbled on the throat and belly.

I believe *Hyla variabilis* Boulenger is a synonym of *Hyla columbiana* Boettger.

CORYTHOMANTIS VENEZOLANA Mertens

Hyla nigromaculata Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.
Corythomantis brunoi Mertens, 1926, Senckenbergiana, *8*: 137.
Corythomantis venezolana Mertens, 1950, Senckenbergiana, *31*: 1: San Fernando de Atabapo, Upper Orinoco.

No material examined.

Original Description. Skull forming a flat, bony helmet, with a rougher dorsal side and rather projecting rims; snout projecting over the mouth opening; pupil roundish, horizontal; tongue heart-shaped, slightly free, clearly notched behind; vomerine odontoids in two small groups between the choanae; no palatine or parasphenoid teeth; canthus distinct; a vertical bony ridge in front of the eye; tympanum about ⅔ the eye diameter; fingers with a short web; toes ⅔ webbed; disks of the fingers ½ the size of the tympanum, of the toes, ⅓; subarticular tubercles larger in fingers than in toes, mostly single; inner side of first finger with a large, blunt tubercle; a rather large, outer and a small inner metatarsal tubercle; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth. Belly granular.

Color. Middle of the back bright brown with darker brown marblings; thighs yellowish, with brown network; upper side of limbs transversely banded; ventral side, gray, without pattern.

Measurements. ♂ ? snout-vent 58; anterior limb 24; posterior limb 83.

Range. Only known from San Fernando de Atabapo.

Remarks. This species can be distinguished from *Corythomantis greeningi* Boulenger by the webbing in the fingers, the narrower and more protuberant snout, the heart-shaped tongue, the not indented posterior margin of helmet and the smaller disks.

Carvalho (1941) pointed out that the specimen collected by Hübner at Sn. Fernando de Atabapo and discussed by Mertens as *Corythomantis brunoi* (1926) probably represented a juvenile of *Trachycephalus nigromaculatus* Tschudi. His conclusion was based on the fact that of the helmeted hylids comprising the genera *Diaglena, Triprion, Pternohyla, Corythomantis, Aparasphenodon* and *Trachycephalus*,[1] only the latter was described with webbed fingers and barred hind limbs.[2] The total absence of palatine and parasphenoid odontoids, a character which Mertens' specimen shares only with *Corythomantis*, is apparently attributed to immaturity of the example, which however, was 58 mm. in length.

In 1950 Mertens described *Corythomantis venezolana* on the basis of his former *Corythomantis brunoi*. I believe it is safe to conclude that Mertens re-examined his specimen in the light of Carvalho's comments and that although it was webbed and barred, he was not convinced of the identity of the animal with the genus *Trachycephalus*. Like *Aparasphenodon*, the latter is described as having palatine teeth, while *Corythomantis* lacks both palatine and parasphenoid teeth.

Examination of the genera mentioned before reveals relationships between some of them. The pupils have been described as horizontally oblong in *Aparasphenodon*, "transversely oval when expanded and subquadrangular when contracted" in *Diaglena*, a transverse slit in *Trachycephalus*, rhomboidal in *Corythomantis*, a vertical slit in *Triprion* and round in *Tetraprion*.[3] I do not consider pupil shape of generic significance if not accompanied by other characters. If this character is not considered valid for separation, two forms can probably be ranked together: *Diaglena* and *Triprion*.[4] The form of their casques is very similar and with little doubt derived one from the other, perhaps *Triprion* from *Diaglena* by further specialization of the skull structure and disappearance of the palatine odontoids. These, and *Tetraprion,* are the only helmeted frogs possessing parasphenoid odontoids and they also have characteristic vomerine odontoids and general physiognomy in common.

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[1] In writing about these helmeted frogs, Carvalho does not mention *Pternohyla*.

[2] *Diaglena, Corythomantis, Aparasphenodon* and *Pternohyla* actually have short webs between the fingers.

[3] *Tetraprion* Stejneger and Test, 1891, was synonymized with *Diaglena* by Boulenger 1891 and with *Triprion* by Günther, 1900, but revived by Myers, 1942.

[4] And probably *Tetraprion*, which I have not had the opportunity to examine.

The relationship of the other forms is not as clear. *Aparasphenodon* is said to have lateral vocal sacs (Cochran, 1955:47),[1] a character it more or less shares with *Trachycephalus*[2] and members of the *Hyla tibiatrix* group. The vomerine odontoids are more or less like those of *Hyla taurina* and *Trachycephalus* but different from the other helmeted frogs here described. The palatine odontoids are shared with *Trachycephalus* and with the Central American *Diaglena, Triprion* and *Pternohyla.* For the present it is perhaps more convenient to keep *Pternohyla, Trachycephalus* and *Aparasphenodon* in separate genera, although the relationships of the latter with *Triprion* (including *Diaglena*), seems to be quite close.

Through the courtesy of Dr. Ernest Williams, I was able to examine the skeleton of one of the only two specimens of *Triprion* at M.C.Z., and examine the sacral diapophyses of one of each of *Diaglena, Pternohyla, Aparasphenodon, Corythomantis, Garbeana* and a few other hylids. Dr. Doris Cochran kindly made available a specimen of *Trachycephalus nigromaculatus* from Brasil.

In *Diaglena, Triprion, Corythomantis, Pternohyla* and *Aparasphenodon,* the sacral diapophyses are considerably dilated, and there is in addition a large cartilaginous alar expansion on their free sides. Furthermore, the ilium, instead of ending at the diapophysis, is not apparently firmly attached to it and continues anteriorly under the alar expansion for a length that varies according to the genus. In *Corythomantis* the ilium extends forward of the diapophysis for only a short distance, but in the other four genera the anterior projection may be quite long. In this respect, *Corythomantis* may be the most primitive, but the examination of only one specimen is not enough to permit any conclusion. It should be remembered, however, that *Corythomantis* is also the only one of the four genera not having palatine or parasphenoid teeth.

[1] A male specimen from Río de Janeiro (M.C.Z. 25694) shows a subgular vocal sac which is perhaps more expanded on the sides.

[2] Although it does not quite show this character, as in the latter the sacs are posterior to the angle of the jaw, while in *Aparasphenodon* they seem to be subgular.

In *Trachycephalus*, the alar expansion of the diapophysis is not too well developed and the ilium does not extend forward beyond its anterior margin. If considered to belong to the *Triprion* group, *Trachycephalus* may be thought to be the most primitive in ilium development, but it has palatine odontoids and two distinct anal flaps that it shares with the Brasilian *Hyla langsdorffi,* a large Brasilian frog with free cranial derm but great similarity with *T. nigromaculatus.* These forms may or may not be within the main line of descent of the *Triprion* group. It appears, however, that the genera *Triprion* (inc. *Diaglena*), *Corythomantis, Pternohyla, Aparasphenodon* and *Tetraprion* constitute a natural group characterized by having the skin of the head involved in the cranial ossification and an ilium that extends beyond the anterior margin of the sacral diapophysis. *Pternohyla* has undergone considerable specialization and may be an early offshoot from the main line.

Incidental to the study of the helmeted frogs of the aforementioned groups, I had the opportunity of examining specimens of *Hemiphractus braconnieri* and *Garbeana garbei* from Ecuador. From the description of the latter and examination of the Ecuadorian specimen (M.C.Z. 19662), I gather it is conspecific with *Hyla boulengeri.* As in *H. braconnieri,* the sacral diapophyses of *G. garbei* are but slightly dilated, there is no alar expansion, and the ilia do not extend forward beyond the diapophyses.

Key to the Species of GASTROTHECA *Reported from Venezuela*

I.	Derm of head involved in cranial ossification	*ovifera*
II.	Derm of head free from cranial ossification	*williamsoni*

GASTROTHECA OVIFERA (Weinland)

Notodelphys ovifera Weinland, 1854, Archiv. Anat. Physiol.: 473, pl. xvii-xix: Venezuela; Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib.: 36.

Ophistodelphia ovifera Ernst, 1877, Flora y Fauna de Ven. (Caracas): 281.

Nototrema oviferum Nieden, 1923, Das Tierreich. Anura I: 323; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44.

Hyla vogli Müller, L., 1938, Zool. Anz., *121*: 284.

4 (U.S.N.M. 121164-7) Colonia Tovar.

Description. Skull rugose; derm of head involved in cranial ossification; two transverse ridges on the occipital region and sometimes two spines on the supratympanic ridge; snout short, rounded; tongue circular, about ¼ free and nicked behind; vomerine odontoids in two transverse groups between the small, round choanae; eye diameter equal to distance between eye and nostril; interorbital space much broader than an upper eyelid; canthus ridged, inclined downwards toward the front; loreal moderately oblique, concave, rugose; tympanum ½ the eye diameter; a fold that arises on the supratympanic ridge runs for a short distance posteriorly; one oval, inner metacarpal tubercle; first finger slightly shorter than second, free; other fingers with a short basal web; largest disks as large as, or larger than, the tympanum; tarsal fold slight or absent; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1½, 1⅔ to 2, 3, 1½; heel of the adpressed hind limb extends to between eye and nostril. Skin above, shagreened; a pair of crescent-shaped folds on the posterior part of the body. Male with a large, subgular vocal pouch.

Color. Above, gray with scattered dark spots; usually a pair of dark lines that begin on the occipital "horns" and extend posteriorly to the dorsal folds; a series of black spots along the flanks and on the anterior and posterior parts of the thighs where they sometimes form crossbars; between the spots, the thighs are rose or salmon. Below, gray, darker on the throat (♂ ♂ ?).

Measurements. ♂ snout-vent 50; head breadth 20; head length 17; femur 28; tibia 28.

Additional Localities. Cerro Avila (U.C.V. 29); Hacienda Los Venados, Avila (Müller, L., 1938); Puerto Cabello (Licht. and Mart., 1856 [= Weinland?]); Venezuela (Nieden, 1923; Lutz, 1927 [= Weinland?]).

Range. The Coastal Range. ?Central America to N. Venezuela.

Remarks. U.C.V. 29 is very dark gray all over the body; the lateral spots are very obscure and the spots on the thighs form well defined crossbars. No reddish or salmon color is visible. The tympanum is ⅔ the eye diameter.

The Central American *Opisthodelphis ovifera* of Günther, 1858, should, according to Taylor, probably be referred to *Anotheca coronata* (Stejneger).

From the description it is evident that *Hyla vogli* Müller is a synonym of this species.

GASTROTHECA WILLIAMSONI Gaige

Gastrotheca williamsoni Gaige, 1922, Occ. Papers Mus. Zool. U. Mich., no. 107: 1-3: San Esteban, Venezuela; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40; Röhl, 1949, Fauna Descr. de Ven., ed., *2*: 402, fig. 182.

1 (U.M.M.Z. 55559, type) Sn. Esteban.

Description. Derm of head free from cranial ossification; snout rounded; tongue large, rounded, deeply notched behind; vomerine odontoids in two transverse groups between the choanae; eye diameter equal to distance between eye and nostril; canthus distinct, curved; loreal concave; tympanum obliquely oval, ¾ the eye diameter; a supratympanic fold to the shoulder; a strong fold between elbow and wrist; first finger as long as second; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 1⅞, 2¼, 2; a faint tarsal fold; a large, inner metatarsal tubercle; subarticular tubercles well developed; toes fully webbed, their disks slightly smaller than those of the fingers and as wide as the horizontal diameter of the tympanum; heel of the adpressed hind limb extends to between tympanum and eye. Skin above, shagreened; pouch opening almost square and attached across the anterior end so it is open to the pouch only on the sides.

Color. Above, reddish gray obscurely spotted with dusky; a darker spot on the back just behind the head; an angular, dark, light-edged mark in front of the pouch with the edge directed forwards, and another faint, angular mark in front of the anus and within the pouch opening; lower lip with indistinct, vertical bars; a row of tiny, dark-edged tubercles connecting the eyelids across the interorbital space; flanks light, with dark vertical bars which slant slightly forward; limbs banded with black; back of the thighs dark, with small, light spots. Throat yellowish; belly and lower surfaces of limbs greenish yellow.

Measurements. Snout-vent 53; head breadth 20; head length 17.5; femur 24; tibia 28.5.

Range. San Esteban.

Remarks. According to Gaige this specimen is closer to *G. longipes* Boulenger, from which it may be distinguished by the difference in coloration, shorter legs and greater webbing of fingers and toes.

The color notes above are taken from the original description, for when I examined the type most of the markings described had faded.

NOTOTHECA PYGMAEA (Boettger)

Nototrema pygmaeum Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40: Puerto Cabello; Zool. Gart., *34*: 129.

1 (U.M.M.Z. 55698) Quebrada Grande, Sn. Esteban.

Description. Derm of head free from cranial ossification; snout short, rounded; tongue broad, adherent and slightly nicked behind; vomerine odontoids in two small, very slightly oblique groups between the round choanae; eye diameter equal to distance between eye and nostril; interorbital space as broad as or a little broader than an upper eyelid; canthus moderate, curved; loreal little oblique, faintly concave; tympanum ⅓ the eye diameter; a short supratympanic fold; a rather flat, inner metacarpal tubercle; subarticular tubercles fairly prominent; fingers free; the first slightly longer than second; larger disks as or slightly larger than the tympanum; a row of tubercles along the tarsus; an oval, inner metatarsal tubercle but no outer; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1¾ to 2, 1¾ to 2, 3½, 2; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth, slightly shagreened on the head; female with a longitudinal fold that ends on the crevice-like opening of the breeding pouch posteriorly.

Color. Above, head and anterior part of the back carmine, with blackish spots and designs, one of which forms a posteriorly-pointing triangle between the eyes; sides of the head and throat with small, white flecks and dots; limbs with blackish crosslines; thighs gray, speckled with gray brown; tibiae of female carmine; feet gray. Below, yellowish, the throat and chin being of a weaker color; hind limbs speckled with gray brown (modified from Boettger). In preservation, specimens are more or less of a plain brown color.

Measurements. Snout-vent 23; head breadth 8.5; head length 8.5; femur 11.2; tibia 13.

Additional Localities. Rancho Grande (U.C.V. 20).

Range. The Coastal Range.

Remarks. Nototheca pygmaea can be distinguished from all Venezuelan *Hyla*, with the exception of *H. marahuaquensis*, by having the first finger longer than the second.

Bokerman (1950) has separated the *Gastrotheca* species with non-adherent head skin and longitudinally opened breeding pouch as the genus *Nototheca* (Genotype, *Coelonotus fissilis* Miranda Ribeiro). For the species whose breeding pouch opens through a supra-anal orifice, he preserves the name *Gastrotheca*, while for those "breeding pouch frogs" having the derm of the head involved in the cranial ossification he suggests the name *Flectonotus* Miranda Ribeiro.

This arrangement will leave *Gastrotheca boliviana* in that genus but the animals so far known as *G. pygmaea* and *G. fitzgeraldi*, will go into *Nototheca*, while *G. ovifera*, *G. helenae*, *G. nicefori* and probably *G. marsupiata* and *G. monticola* will be included in the genus *Flectonotus*. The latter two have ossified head skin, but the derm is not actually involved in the cranial ossification. *G. williamsoni* and *G. argenteoventris*, which have free cranial derm, do not have, however, a longitudinally opened pouch, so that they will be difficult to allocate under this arrangement.

Although recognizing the probability of a different origin for the frogs of the *G. pygmaea* group, and the convenience of separating them into another genus, I have preferred to maintain the other Venezuelan breeding pouch frogs in the genus *Gastrotheca*, until a more complete study of the "marsupial" frogs is made.

Nototheca fitzgeraldi (Parker) may prove to be conspecific with *N. pygmaea*. A specimen from Tobago at M.C.Z. (27784) carries five large eggs on its back.

Key to the Species of PHYLLOMEDUSA *Reported from Venezuela*

I. First and second toes equal .... *bicolor*
II. First toe longer than second.
  A. Vomerine teeth present; parotids distinct; green above; spotted white on the flanks .... *burmeisteri trinitatis*
  B. Vomerine teeth absent; parotids indistinct; purple above; striated on the flanks .... *h. hypocondrialis*

PHYLLOMEDUSA BICOLOR (Boddaert)

Rana bicolore Boddaert, 1772, Epist. de Rana bicolore: 1, pl. iv, figs. 1-5: Surinam.

2 (U.P.R. 185-6) Sn. Fdo. de Atabapo.

Description. Head much broader than long; snout truncate; tongue entire, free behind; vomerine odontoids in two short, slightly oblique series between the large choanae; eye diameter shorter than distance between eye and nostril; interorbital space almost twice as broad as an upper eyelid; canthus angular; loreal straight, excavated; tympanum large, its posterodorsal margin hidden by the parotid, ¾ the eye diameter; parotid long, extending almost to the groin but much more prominent and distinct on the supratympanic region; a large oval, inner metacarpal tubercle; subarticular tubercles large; fingers free, with a slight but thick lateral edge; first finger shorter than second, which is shorter than fourth; disks large, about ⅔ the size of the tympanum; hind limbs feeble for the body size; no tarsal fold;

subarticular tubercles of toes large, rounded; a slight web between third and fourth toe; other toes free, with a thick lateral edge; first toe as long as the second, second shorter than fifth; disks of the first three toes smaller than the other two; heel of the adpressed hind limb extends to the shoulder; upper surfaces studded with bony deposits. Male with a brown rugosity on the inner side of the first digit but no apparent external vocal sac.

Color. Above, bright green (blue green in preserved specimens); posterior and anterior surfaces of thighs and inguinal region dirty white with purple reticulations or milky white, purple-edged spots; lower eyelid marked with purple-edged, white spots. Ventral surfaces of the body and limbs white; margin between the green upper and the white ventral color marked by purple-edged spots or by a white, purple-edged line on the fore limbs and distal segments of the hind limb; fingers white, except the last two, which might be particolored or with green spots; first three toes white, immaculate or with spots; outer two, green; disks of fingers and toes blue green, sometimes with white spots; lower lip with white, purple-edged elongated spots; a pair of white, purple-edged spots on the sides of the anal opening and two others on the breast, at the base of the forelimbs.

Measurements. Snout-vent ♂ 103, ♀ 112; head breadth ♂ 35.5, ♀ 39; head length ♂ 32, ♀ 33; femur ♂ 30, ♀ 31; tibia ♂ 36, ♀ 40.

Habits. The pair of specimens reported here were collected at night, during amplexus, on the ground, about 20 feet from a shallow pool. The voice is a trumpet-like "trrrbp."

Range. The Venezuelan Guayana. The Guianas to Perú.

Remarks. The two Venezuelan specimens have much smaller disks than either the Dutch Guiana or Peruvian individuals with which they have been compared; the first two toes seem to be also more reduced, the canthus more angular and the loreal region more vertical. There is also some difference in the markings between the upper and lower colors in the body of the Peruvian animal (M.C.Z. 4766).

PHYLLOMEDUSA BURMEISTERI TRINITATIS Mertens

Phyllomedusa trinitatis Mertens, 1926, Senckenbergiana, *8*: 145: Port of Spain.

3 (C.N.H.M. 29181-3) Urama.

Description. Head broader than long; snout subovoid, truncate as seen from above; tongue oval, entire or nicked behind; vomerine odontoids in two short, slightly oblique and posteriorly convergent groups between the large, oval choanae; eye diameter equal or scarcely greater than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus well defined, slightly curved; loreal slightly oblique, concave; tympanum ½ to ⅔ the eye diameter; parotid extending to the sacrum or farther back, but more prominent on the supratympanic region; an oval, well-defined inner metacarpal tubercle; subarticular tubercles large; fingers free; the first shorter than the second, which is shorter than the fourth; largest disk about ½ the size of the tympanum; a flat, oval, inner and a small indistinct outer metatarsal tubercle; toes free, with a thick lateral edge; first toe longer than second; disks of first three toes smaller than the others; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above studded with bony deposits on the posterior half. Male with a brown rugosity on the inner side of the first digit but no apparent external vocal sac.

Color. Above green, the flanks with white spots; ground color on the posterior part of the flanks purplish, with white spots; lower eyelids margined with white; lower lip distinctly margined with white; a transverse white line above the anus. Ventral surfaces of the throat, chest and limbs purplish, with a few white spots near the chest and thighs, a pair of white spots under the thighs on each side of the anus; limbs green above, yellowish or purplish beneath, the two colors separated on the posterior part of the humerus and tarsal segment by a definite purple-margined line; on the anterior part of the hind limb and also on the posterior part of the thighs and tibiae the green color changes to purple before assuming the yellowish color of the underparts; a series of white spots appear in this purple area from groin to inner toes; three inner toes white, sometimes with purplish spots, but only the disks of the two inner toes are white; three outer toes and also part of the fourth white, but the disk of the fourth is colored. A number of white spots at the base of the forearms.

Measurements. Snout-vent ♂ 65, ♀ 72; head breadth ♂ 22, ♀ 25; head length ♂ 20.5, ♀ 23; femur ♂ 30, ♀ 32; tibia ♂ 30.5, ♀ 34.

Localities. El Periquito (U.C.V. 90).

Range. The Coastal Range. The species extends from Trinidad to Argentina. The race is apparently limited to Trinidad, N. Venezuela, the Guianas and perhaps N. Brasil.

Remarks. Phyllomedusa burmeisteri burmeisteri from southern Brasil has very well defined and relatively large, white spots on the thighs, and some specimens are beautifully spotted with white on the throat. The specimens available to me for comparison (3) are considerably smaller than the Venezuelan and Trinidad specimens. One of the latter is 83 mm. long and the anterior and posterior parts of the thighs are purple, with whitish, very obscure spots.

PHYLLOMEDUSA HYPOCONDRIALIS HYPOCONDRIALIS (Daudin)

Hyla hypocondrialis Daudin, 1803, Hist. Rainette: 29 (*hypochondrialis* on pl. x, fig. 1): Surinam.

2 (U.P.R. 187-8) Pto. Ayacucho, vi.50.

Description. Snout short, truncate, slightly longer than the eye diameter; tongue narrow, entire and free behind; vomerine odontoids absent; eye diameter greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus moderately angular, somewhat curved; loreal almost straight, concave; tympanum fairly distinct, its dorsoposterior margin hidden by the parotid; parotids indistinct; male with a brown rugosity in the inner side of the first digit; fingers free, the first shorter than the second, which is shorter than the fourth, fourth extending to the disk of the third; disks of the fingers about ⅔ the diameter of the tympanum; toes free; first toe much longer than second, fourth shorter than fifth; disks of the second and third toe smaller than the others; heel of the adpressed hind limb extends to the tympanum. Skin above smooth; underside of forearms granular. Male with a small external subgular vocal sac.

Color. Above and on the sides of the head, bluish purple; upper lip and flanks white, the latter with purplish, vertical bars; humerus white, with cross reticulations; forearm purplish; thighs white, with purplish crossbars and a longitudinal purplish brown stripe along its dorsal surface; tibial and tarsal segments purplish; concealed surfaces of the limbs with crossbars; ventral surfaces yellowish white.

Measurements. Snout-vent ♂ 36, ♀ 44; head breadth ♂ 12, ♀ 13.1; head length ♂ 11, ♀ 12.1; femur ♂ 10, ♀ 15; tibia ♂ 13, ♀ 16.

Habits. Collected at night in the tall grass of an inundated area. The female specimen is filled with very large, yellow eggs.

Range. The Venezuelan Guayana. British Guiana to N. Brasil. *Phyllomedusa hypocondrialis azurea* Cope is found in Paraguay and Argentina. It is easily distinguished from the northern form by its much smaller disks, which are not broader than the width of the fingers. Five Pernambuco specimens at the M.C.Z. seem to be intermediate in disk size. The race is not, however, recognized by Funkhouser (1957).

Remarks. The spelling *hypocondrialis* has been preferred to *hypochondrialis* not only because Daudin used it in the text of the original description but also because he repeated it in another paper (Hist. Rept., 1803b, *8*: 60).

CENTROLENIDAE

Key to the Species of COCHRANELLA *Reported from Venezuela*

I. Fingers practically free, the first shorter than second; above, purple or bluish .... *buckleyi*
II. Fingers webbed, the first equal or slightly longer than second; above, green (in life) or yellowish white.
  A. Tympanum present; melanophores large and abundant .... Species indeterminata
  B. Typanum absent; melanophores not distinct .... *fleishmanni*

COCHRANELLA BUCKLEYI (Boulenger)

Hylella buckleyi Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 420, pl. xxv, fig. 5: E. Ecuador.
Centrolenella buckleyi Noble, 1920, Bull. Amer. Mus. Nat. Hist., *42*: 442.

1 (M.C.Z. 2526) Mérida.

Description. Snout semicircular, almost as long as the eye diameter; tongue rounded, about ½ free, nicked behind; vomerine odontoids absent; choanae small, round; interorbital space broader than an upper eyelid; canthus indistinct; loreal oblique, concave; tympanum indistinct; a fold from elbow to disk of fourth finger; a flat outer and a small, oval, inner metacarpal tubercle; subarticular tubercles flat; fingers depressed, practically free, the first shorter than second; disk of the fourth finger extending to the base of the disk of the third; disks large, truncate, larger than the tympanum; no humeral or tarsal folds; a flat inner metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: 1⅔, 1¼, 1⅔, 3, 1¾; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the nostril. Skin above, smooth.

Color. Above, bluish purple; a broad bluish purple band above the arm and another narrow one along the dorsal surface of the thigh, tibia and tarsus; remaining parts of the limbs yellowish. Ventral surfaces yellowish.

Measurements. ♀ Snout-vent 32.8; head breadth 11; head length 9; femur 16; tibia 17.

Range. The Venezuelan Andes and probably the Coastal Range. Eastern face of the Andes of Ecuador through Colombia to Venezuela.

Remarks. The specimen described here had been previously studied and dissected by Noble, who erroneously refers to this specimen as collected in Ecuador by Rosenberg (Noble, 1920: 442).

The genus *Centrolenella,* proposed by Noble (1920: 441) was found untenable by Dunn (1931: 399). Taylor (1951) on the basis of absence of vomerine teeth has proposed the name *Cochranella* for most of the species that were included under the name *Centrolenella* (the genotype was found to be a *Centrolene*).

COCHRANELLA sp.

1 (M.C.Z. 28569) Temiche, Mt. Marahuaca, 4050 ft., v.50.

Description. Snout semicircular, more or less as long as the eye diameter; tongue round, mostly adherent and indistinctly nicked behind; vomerine odontoids absent; choanae round; interorbital space as broad as an upper eyelid; canthus very indistinct; loreal oblique, slightly concave; tympanum small and indistinct, about ⅓ the eye diameter; no humeral spine; first finger a little longer than second; outer two fingers webbed, the web leaving about two free phalanges on the third and 1⅞ on the fourth finger; a flat, inner metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1¼, 1, 2¼ to 2½, 1; heel of the adpressed hind limb extends to the nostril. Skin above, smooth.

Color. Above, green with yellow mottles (in life) or yellowish white and with a relatively great profusion of melanophores (alcohol after formalin); upper eyelid golden. Below, whitish.

Measurements. ♀ ? Snout-vent 20; head breadth 7; head length 6.5; femur 11; tibia 11.

Remarks. This form is very similar to *Cochranella fleishmanni* from which it is distinguished by the presence of a tympanum and by the great profusion of melanophores on the dorsal surface of body and limbs.

The animal was about to be named when, due to some unfortunate circumstance, the alcohol in the jar evaporated and the specimen dried out considerably. It was slightly restored with sodium triphosphate, but not sufficiently to bring out its original characters. Although there is a photograph of it, I prefer not to describe it as a species.

COCHRANELLA FLEISHMANNI (Boettger)

Hylella fleishmanni Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 251: San José, Costa Rica.

2 (U.S.N.M. 117523-4) Los Canales.
5 (U.S.N.M. 128789-93) R. Chacaíto, viii, ix.38-39.
3 (U.S.N.M. 128796-8) Los Canales.
1 (U.S.N.M. 128800) Colonia Tovar, i.39.
1 (U.S.N.M. 128801) Camino de Galipán, R. Cotiza, iii.39.

Description. Snout semicircular, equal to the eye diameter; tongue rounded, ⅓ free and slightly nicked behind; vomerine odontoids absent; choanae small and round; interorbital space slightly broader than an upper eyelid; canthus absent or very indistinct; loreal oblique, not concave; tympanum hidden; no humeral spine; first finger more or less equal to second; only two outer fingers webbed, the web leaving two free phalanges on the third and 1½ to 1⅞ on the fourth finger; fingers flat, disks truncate; a small inner metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: 1½, 1, 1½, 2½, 1½; heel of the adpressed hind limb extends to between eye and nostril. Skin above, slightly shagreened.

Color. Yellowish white throughout; no apparent chromatophores; eyelids white.

Measurements. Snout-vent 25; head breadth 9; head length 7.5; femur 13.5; tibia 13.

Range. The Coastal Range and probably the lower Andean slopes. Central America to Venezuela. Dr. Dunn informed me that the species has been collected at the eastern base of the Andes of Colombia.

Remarks. In some specimens the tongue is entire and in one the heel reaches the tip of the snout.

DENDROBATIDAE

Key to the Genera of Dendrobatidae Reported from Venezuela

I. Upper jaw toothed.
  A. Toes webbed; ground color generally black or gray . . . . *Prostherapis*

B. Toes free or with a rudiment of web; ground color generally brown or tan .... *Phyllobates*

II. Upper jaw toothless.

A. Toes webless .... *Dendrobates*

Key to the Species of PROSTHERAPIS *Reported from Venezuela*

I. Toes ½ webbed or more (not more than two free phalanges on the fifth and third and 1½ on the second toe).

A. Toes not fully webbed.

1. A black band across the chest .... *collaris*

2. No black band across the chest .... *shrevei*

B. Toes fully webbed, with the exception of the fourth; above spotted with white; no dark band across the chest .... *dunni*

II. Toes not more than ⅓ webbed.

A. A black band across the chest.[1]

1. Lower surface of dorsolateral band ending anteriorly at the corner of the eye; orbito-tympanic space white or whitish; loreal region usually with dark scribblings; chest band broad and well defined .... *t. trinitatis*

2. Lower surface of dorsolateral band ending anteriorly at or near the lower margin of the eye; orbitotympanic space black; loreal region usually of uniform white color; chest band usually narrow and ill defined (♂ ♂) .... *neblina*

B. No black band across the chest.

1. Snout short and rounded; first finger shorter than second; most or all of the ventral surfaces dark, with white dots .... *alboguttatus*

2. Snout truncate; first finger shorter than second; above, greenish silvery with an irregular vertebral and two lateral bands; ventral surfaces light with obscure darker spots . . *trinitatis mandelorum*

PROSTHERAPIS COLLARIS (Boulenger)

Phyllobates trinitatis Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 482.

Hylixalus collaris Boulenger, 1912, Ann. Mag. Nat. Hist., (8) *10*: 190: Mérida, 5,200 ft. and Río Albarregas, 11,300 ft.

Hyloxalus collaris Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

3 (M.C.Z. 3887, 10723-4) Río Albarregas, Mérida.
8 (U.M.M.Z. 58909) Río Albarregas, Mérida.
1 (U.M.M.Z. 51267) Río Albarregas, nr. Mérida.
2 (C.N.H.M. 3558-9) Río Albarregas, Mérida.
1 (U.S.N.M. 118678) Mérida.
4 (A.M.N.H. 10512-15) Río Albarregas, nr. Mérida.
3 (A.M.N.H. 10690, 10695-6) Mérida.

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[1] May be absent in occasional specimens of *P. t. trinitatis* or *P. neblina*.

Description. Snout subovoid, not truncate; tongue oval or spatulate, free, entire or slightly emarginate behind; eye diameter greater than distance between eye and nostril but a little shorter than the snout; interorbital space broader than an upper eyelid; canthus rounded; loreal almost straight, slightly concave, if at all; tympanum indistinct or hidden, about ½ the eye diameter; two flat, not distinct, metacarpal tubercles; fingers free, the first shorter than second; an oblique, distinct tarsal fold; two small metatarsal tubercles; toes taken in order from first to fifth exhibit the following phalanges free of web: 1½, 1½, 2, 3½ to 3¾, 2; the web extends to the disks as distinct lateral fringes; heel of the adpressed hind limb extends to the eye. Skin above and below, smooth.

Color. Above and on the sides of the head and body grayish brown; loreal region probably lighter than rest of the head; flanks sometimes with white spots in and near the groins. Ventral surfaces yellowish white, with some infuscation on the limbs and a broad brown band across the chest; posterior part of the thighs obscurely marbled with light.

Measurements. Snout-vent ♂ 27, ♀ 32; head breadth ♂ 10, ♀ 12; head length ♂ 9, ♀ 10.5; femur ♂ 12, ♀ 15; tibia ♂ 12.5, ♀ 15.

Range. The subtropical zone and above in the Mérida Andes.

Remarks. In 1940 Hellmich "corrected" Boulenger's description of *Prostherapis collaris* on the basis of differences found between his 656 specimens and the original description. All his specimens were from the Coastal Range where *P. collaris* does not exist, an indication that what he had were *P. trinitatis trinitatis.*

PROSTHERAPIS SHREVEI sp. n.

Type. Museum of Comparative Zoology No. 28567, a ♂ from Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950.

Diagnosis. A *Prostherapis* with truncate snout, tympanum present, first finger shorter than second, a short tarsal fold, toes exhibiting the following phalanges free of web: 1, 1, 1½, 3¾, 1¾; brown dorsal color, having one interorbital, one or two scapular, two sacral and one preanal dark spots and crossbarred limbs.

Description. Snout truncate; tongue narrow, indistinctly nicked behind; eye diameter greater than distance between eye and nostril, almost as long as the snout; interorbital space broader than an upper eyelid; canthus angular; loreal vertical, not concave; tympanum not very distinct, ½ the eye diameter, dorsally hidden by a flat skin fold; a flat, round, outer and a smaller, oval, inner metacarpal tubercle; first finger shorter than second; subarticular tubercles oval, not very prominent; disks smaller than the tympanum; a short but distinct fold at the distal half of the tarsus; metatarsal tubercles small, the outer round, the inner elongated and more prominent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1¼, 1¼, 2¼, 3¼, 1⅔; web extended to the disks as distinct lateral fringes; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth, somewhat rugose behind the eyes and on the flanks. Belly finely granular under a lens.

Color. Above, dark brown with an interorbital spot, another dark spot on the scapular region, two others in front of the sacrum and a single one behind these; a number of white, radiating lines from lower eyelid to upper lip; one of these extends posteriorly to the shoulder; flanks very dark brown, with white spots that sometimes fuse with the ventral color; a line of white dots from groin to about middle of the flank; limbs crossbarred, the bars being oblique and very distinct on the thighs; fingers and toes barred brown and white. Below, pure white.

Measurements. ♂ Snout-vent 21.5; head breadth 8; head length 8; femur 10.5; tibia 11.

Habits. Collected in the proximity of streams or on stones within streams.

Remarks. Except for specimen No. U.P.R. 232, the paratypes are not in very good condition and U.P.R. 234 and 235 are juveniles.

U.P.R. 140, Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 30.5; head breadth 7; head length 7; femur 10; tibia 11. Very similar to type in all respects but the snout is shorter and blunter, probably because it has received a blow from the front. Toes exhibiting the following phalanges free of web: 1½, 1½, 2, 3½, 1¾.

U.P.R. 232, ♀, Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 36; head breadth 9; head length 9; femur 12.5; tibia 12. Toes exhibiting the following phalanges free of web: 1½, 1½, 2½, 3, 1½. Almost solid brown above, the scapular and sacral spots, the loreal bars and the crossbars of the limbs being very obscure. Throat, chest and anterior part of the belly with peculiar chocolate spotting or speckling.

U.P.R. 233, ♂ ?, Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 20; head breadth 7.5; head length 7; femur 11; tibia 11.5. Toes exhibiting the following phalanges free of web: 1½, 1½, 2, 3, 2½. Dark brown above; spots obscure; venter with brown mottling on the throat, chest and anterior part of the belly.

U.P.R. 234-5, Mt. Marahuaca, 5000-6000 ft. Juvenile specimens agreeing in all characters with the type.

U.P.R. 236, Mt. Duida, about 1500-2000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 17.5; head breadth 6.5; head length 6; femur 8; tibia 9. Except for its lighter loreal region and smaller size, this Mt. Duida specimen is almost identical with the type from Marahuaca.

This species agrees best with *Prostherapis bocagei* (Espada) of which it is perhaps a race. It differs from this form in its slightly less webbed toes, more slender build, distinct crossbanding of the limbs and in its apparently persistent dark spotting above. Spotting may also occur in *P. bocagei* but it does not show the same pattern in this species as in *P. shrevei*. Apparently, *Prostherapis shrevei* represents another high altitude, Guayanan frog with Andean relationships.

The species is named after Mr. Benjamin Shreve of the Museum of Comparative Zoology.

PROSTHERAPIS DUNNI sp. n.

Type. Chicago Natural History Museum No. 35987, a ♀ from above Caracas, D. F. Coll. Padre Cornelio Vogl, 1940.

Diagnosis. A *Prostherapis* with a short rounded snout, equal to the eye diameter; first finger shorter than second; fully webbed toes; dorsum spotted with white; hind limbs banded with brown and yellow.

Description. Snout short, subtriangular but with a blunt tip; tongue small, oval, entire and free behind; eye diameter as long as the snout; interorbital space slightly broader than an upper eyelid; canthus angular; loreal vertical, not concave; tympanum not very distinct, ⅓ the eye diameter; two metacarpal tubercles; first finger shorter than second; disks relatively large, short; an indistinct, oblique tarsal fold; two small metatarsal tubercles; subarticular tubercles of fingers and toes small; toes fully webbed with the exception of the fourth, which has two phalanges free; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above and below, smooth.

Color. Above, brown with whitish and yellowish spots of irregular size and form; a dark brown band that begins at the posterior corner of the eye continues for a short distance posteriorly and then merges with rest of the body color; loreal region below the level of the nostrils light with dark scribblings; a light line extends from anterior corner of the eye, around the tip of the snout, to the other eye; another whitish, ill-defined line crosses the tympanic disk and extends to the shoulder; a relatively broad, irregularly margined line from groin toward shoulder; posterior part of the thighs with an irregularly margined, longitudinal, yellow band; thighs above, and rest of the limbs, with distinct brown crossbands that are separated by yellow areas. Throat yellowish, with some slight infuscation on the margins of the jaw; belly white; hind limbs yellow.

Measurements. ♀ Snout-vent 24; head breadth 8; head length 8; femur 13; tibia 12.5.

Remarks. The 8 paratypes (C.N.H.M. 67379-67384) have the same data as the type and differ from it only in minor details. No. 67379 is a male, with the following measurements: snout-vent 20; head breadth 7.5; head length 8; femur 11; tibia 11. The largest specimen is No. 67384 with 25 mm. in snout-vent length and the smallest, No. 67380 with 18 mm. In some specimens there is more yellow and less brown on the thighs as compared with the type while in others the dorsal spots are larger and the crossbars on the limbs better defined.

This peculiar *Prostherapis* does not have any close relative in Venezuela. *Prostherapis alboguttatus* from the Mérida Andes has a more rounded snout, much less webbing and different ventral and dorsal coloration.

PROSTHERAPIS TRINITATIS TRINITATIS (Garman)

Phyllobates trinitatis Garman, 1887, Bull. Essex Inst., *19*: 13: Trinidad; Stejneger, 1902, Proc. U.S. Nat. Mus., *24*: 179; Lutz, A., Mem. Inst. Osw. Cruz, *20*: 40, 46; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 537; Alemán, 1952, Mem. Soc. Cienc. Nat. LaSalle, *12*: 29, fig. 3.

Prostherapis herminae Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 37.

Hyloxalus collaris Hellmich, 1940, Bol. Soc. Ven. Cienc. Nat., *6*: 318; Zool. Anz., *131*: 119.

6 (M.C.Z. 26147-9 + 3 dupl.) Cerro Cosme.

Description. Snout short, truncate; tongue oval, free and slightly nicked behind; eye diameter longer than distance between eye and nostril but shorter than the snout; interorbital space broader than an upper eyelid; canthus angular; loreal vertical, on occasions slightly concave; tympanum ½ the eye diameter, its posterodorsal margin concealed under a skin fold; metacarpal tubercles indistinct; fingers free, their disks smaller than the tympanum; first finger slightly shorter or equal to second; a short oblique fold at the distal half of the tarsus; metatarsal tubercles small; two inner toes with a rudiment of web, the others with the following phalanges free of web: 2, 3, all; heel of the adpressed hind limb extends to the middle of the eye or between eye and nostril. Skin above, smooth or tubercular; usually tubercular beyond the sacrum; ventral surfaces smooth.

Color. Above, dark grayish brown; loreal region light with dark scribblings; humerus with an anterior dark longitudinal line; a white lateral line from groin to about the middle of the flank; other white dots are usually present on the flanks; posterior part of the thighs obscurely marbled; hind limbs indistinctly crossbarred. Ventral surfaces white with a distinct, but narrow, brown band across the chest.

Measurements. Snout-vent ♂ 23, ♀ 26; head breadth ♂ 8, ♀ 9; head length ♂ 7.5, ♀ 9; femur ♂ 11, ♀ 11; tibia ♂ 11.5, ♀ 12.5.

Additional Localities. Baruta (Alemán, 1952); Camino de Galipán, R. Cotiza (U.S.N.M. 128782-3); Caracas (Hellmich, 1940); Cerro Avila (U.C.V. 96-8, 2016-7); Colonia Tovar (U.S.N.M. 128781, 117540, 121135-43); Cordillera Padre Vogl (Hellmich, 1940); Cueva del Guácharo (U.C.V. 1); La Guaira (U.S.N.M. 27792 [= Stejneger, 1902]); Laguna de Valencia (Hellmich, 1940); Los Canales (U.S.N.M. 128900, 128777-80); Macuto (C.N.H.M. 5650); Maracay (Lutz, 1927); Pie de Avila (U.C.V. 109, 111); Pie del Cerro (U.S.N.M. 121144-5); Puerto Cabello (Boettger, 1893); Rancho Grande (M.C.Z. 26953-9; U.C.V. 23-27, 39-40, 63, 70-5, 84); Río Chacaíto (U.S.N.M. 117538-9); Sn. Esteban (U.M.M.Z. 55687-9, 55546-9 [6]); Sn. Julián (U.S.N.M. 27808 [= Stejneger, 1902]); Turgua (Alemán, 1952); Mt. Turumiquire 17790 [10 = Schmidt, 1952]).

Range. The Coastal Range and the northeastern Falcón Region. Trinidad.

Remarks. The specimens described differ from other Venezuelan material and from the cotypes in their larger, stouter body, longer and more truncate snout, distinctly tubercular dorsal surfaces (irrespective of sex) and brown coloration in which the dark lateral band is not generally distinguishable.

There seems to be considerable variation in *Prostherapis t. trinitatis* in general and this has led to the inclusion within the species of several sibling forms that probably deserve specific distinction. Dr. Test has just detected one such case in his *P. neblina*, but others may be found.

M.C.Z. 26959 and less distinctly C.N.H.M. 5650 are all black above and below, the first only having a whitish area on the ventral aspect between the thighs and under the tibiae. In M.C.Z. 26953-8 the limbs are much lighter than the body color and the thighs are very distinctly crossbarred, the bars being separated by very light areas. The two Pie de Avila individuals have a pair of light bands extending backwards from behind the eyes. Although present in many *P. t. trinitatis* these bands are much more distinct and striking in the two Avila specimens as they continue inwards on the sides of the dorsum.

U.C.V. 2016 and 2017 from Cerro Avila are of enormous size (32.5 and 30.5 mm.) and have white spots on the dorsal surfaces and a broader, less tapering snout. U.C.V. 96, 98 and 109 represent this same form.

Three males carrying tadpoles on their backs have been examined. In every instance the adult frog is a much lighter gray than is normal for *P. t. trinitatis*. U.C.V. 74, also of very light grayish color, is probably a male that has recently shed its load of tadpoles.

PROSTHERAPIS TRINITATIS MANDELORUM (Schmidt)

Phyllobates mandelorum Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160: Mt. Turumiquire, 8,000 ft., Venezuela.

2 (C.N.H.M. 17788-9, type + paratype) Mt. Turumiquire, 8000 ft.

Description (from original). Distinguished from the typical species by its dorsal and ventral coloration. The dorsum, including the top of the head is greenish silvery, sharply distinct from the chocolate colored sides; a dark irregular vertebral band of the same color as the sides begins with an expansion between the eyes and extends nearly to the hind limbs; this band widens and encloses a light spot opposite the shoulders; the dark color of the sides extends around the snout; a silvery band on the upper jaw connects with the same color on the upper arm; border of upper jaw dark; a light line extends forward from the groin in the dark lateral band, which is not reached by the broad dark bars of the upper and posterior surfaces; tibia barred.

Ventral surfaces light with obscure darker spots; chest without trace of transverse dark band.

Measurements. Snout-vent 26; head breadth 8.5; head length 8.5; femur 12; tibia 11.5.

Range. Mt. Turumiquire.

Remarks. The type of *P. t. mandelorum* has a striking similarity to some of the cotypes of *P. t. trinitatis.* In some of the latter the chest band is very extensive and does not really form a band, while in others it is not very distinct. The similarity is, of course, to be expected as Mt. Turumiquire is relatively close to the type locality of *P. t. trinitatis.*

PROSTHERAPIS NEBLINA Test

Prostherapis neblina Test, 1956, Occ. Pap. Mus. Zool. Univ. Mich., No. 577: 2: Portachuelo Pass, Rancho Grande.

2 (U.M.M.Z. 103011, 103014) Portachuelo Pass, Rancho Grande, 900-1100 m., 51.

Description. Snout short, truncate; tongue pyriform, ½ free and nicked behind; eye diameter as long as the snout; interorbital space as broad as an upper eyelid; canthus angular; loreal vertical; tympanum ½ the eye diameter, its posterodorsal margin concealed under a skin fold; a round, prominent palmar and a smaller, oval, inner metacarpal tubercle; fingers free; first finger equal to second when adpressed in the middle; disks smaller than the tympanum; a distinct, oblique tarsal fold; metatarsal tubercles small but prominent and distinct; subarticular tubercles rounded; toes with a short basal web; taken in order from first to fifth, with the following phalanges free of web: 2, 2, 3, practically all, practically all; the web continues to the disks as conspicuous lateral fringes; disks of toes approximately the same size as that of the tympanum; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth or slightly shagreened, occasionally with sparse tubercles, or more closely set ones behind the sacral region.

Color. Grayish brown, with two dark brown lateral bands from tip of the snout to inguinal region; behind the eye, the lower margin of the band starts at about 7:00 o'clock (considering the eyeball as a clock face) so that all the space between tympanum and eye is of a dark color and the tympanum falls within the dark area, only its lower margin touching the white upper lip; lower section of the loreal region below the nostril and to approximately 4:00 o'clock on the right side of the eyeball, white, with a slight infuscation but no markings or reticulations of any sort; the white color continues posteriorly below the eye and tympanum to the forearm; a light colored line above the brown lateral band from upper eyelid to lumbar area; a white line extending anteriorly within the dark band from groin, to about halfway on the flanks; an oblique, wedge-shaped bar on the anterior side of the forearm; limbs crossbanded, the bands diffusing and forming reticulations on the posterior aspect of the thighs. Below, white, immaculate, except for a narrow dark band across the anterior part of the chest.

Measurements. Snout-vent 26.8; head length 9.3; head breadth 9.2; femur 9.2; tibia 12.8.

Habits. P. neblina is an inhabitant of humid slopes. Its voice consists of a series of short trills, while that of *P. trinitatis,* a frog of small streams is a series of clearly defined single notes. Upon being approached, *P. trinitatis* moves hurriedly away, while *P. neblina* permits close approximation and then moves away with short hops (Test, *op. cit.*).

Range. Definitely known only from the type locality. U.C.V. 21, 22 and 34, included under *P. trinitatis trinitatis* (see "Localities" under that species) may be referable to this form. Unfortunately, they were available for examination only before *P. neblina* was described.

Remarks. According to Test, the variation in this species is small, although males tend to have narrower chest bands (sometimes scarcely indicated) and more infuscation of the light areas. The dorsal surfaces may be uniform blackish or with faintly indicated mottles, and the lateral whitish line may be of variable forward extent. In some specimens the lateral black area is interrupted by whitish mottling and the dark bars of the limbs may be equally broken by mottling or freckling.

Living *P. neblina* can be easily distinguished from *P. trinitatis trinitatis,* by the yellow ventral surfaces of the legs and to a lesser extent of the body, and by the uniformly dark brown back margined by the tan (whitish in alcohol) dorsolateral stripes (Test, *op cit.*). Alcoholic specimens are much more difficult to distinguish. In *P. neblina* the tympanum and the space between tympanum and eye are enclosed within the black area of the lateral band, while in *P. t. trinitatis*, the lower parts of tympanum and orbito-tympanic space are white. *P. neblina* is also said to have a less constant and conspicuous chest bar, more uniformly colored (white) upper lip, more uniform dorsal color, more distinct dorsolateral stripes, a larger size, narrower head and more prominently banded limbs. However, many good *P. t. trinitatis* have very distinctly banded limbs.

It is possible that some of Hellmich's *P. trinitatis* material (see synonymy of that species) may have included *P. neblina,* although the ventral surfaces are described as gray, with throat, anterior chest and sides of the belly dark blue gray. Lutz, 1927, describes the females of his specimens of *P. trinitatis* as having orange ventral surfaces, an indication that he may have had the two species.

PROSTHERAPIS ALBOGUTTATUS (Boulenger)

Phyllobates alboguttatus Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 482: Mérida, 1600 m.; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40, 47.

5 (U.M.M.Z. 58904) Mérida.
1 (U.M.M.Z. 51266) Mérida.
2 (C.N.H.M. 3661-2) Mérida.
3 (A.M.N.H. 10551-53) La Culata, 3,000 m.
8 (A.M.N.H. 644, 646-8, 649-51, 3137) Mérida.

Description. Snout short, rounded; nostrils more or less equidistant between eye and tip of the snout; tongue oval, free, entire or faintly nicked behind; interorbital space broader than an upper eyelid; canthus rounded or bluntly angular; loreal almost vertical, not concave; tympanum indistinct, ½ to ⅔ the eye diameter; a large rounded outer and a small oval, inner metacarpal tubercle; subarticular tubercles rounded, not prominent; fingers free, the first extending to the disk of the second; larger disks smaller than the tympanum; two small metatarsal tubercles; first four toes with a short basal web that extends as lateral fringes to the disks, outer toe practically free; heel of the adpressed hind limb extends to the eye. Skin above and below, smooth.

Color. Above, brownish gray with obscure darker markings and two broad, dark brown, lateral bands that extend from the tip of snout to inguinal region; above these there is apparently a light line from behind the eyelids backwards; flanks dotted with white; hindlimbs spotted or crossbanded; throat, breast and anterior part of the belly brown, dotted with white; posterior part of the belly and thighs generally white.

Measurements. Snout-vent ♂ 25, ♀ 26.5; head breadth ♂ 9.5, ♀ 10; head length ♂ 8, ♀ 9; femur ♂ 11, ♀ 11.5; tibia ♂ 11, ♀ 11.5.

Range. The subtropical zone and above in the Mérida Andes.

Remarks. In some specimens the brown ventral color is restricted to the pectoral region and a transverse bar similar to the one that occurs in *P. trinitatis* and *P. collaris* is formed. Apparently this is pure coincidence and does not indicate close relationship between these forms.

On some of the specimens all the ventral surfaces are dark brown, distinctly dotted with white. On the dorsal surface, however, the spots described by Boulenger were not detected in any specimen.

Prostherapis alboguttatus can be easily distinguished from *P. trinitatis* by its rounded, not truncate snout, nostril equidistant between eye and tip of the snout (in some specimens they are slightly closer to the eye), and different coloration.

Key to the Species of PHYLLOBATES *Reported from Venezuela*

I. Third and fifth toes equal, no tarsal tubercle or fold; tympanum distinct .... *bromelicola*

II. Third and fifth toes subequal; a tarsal fold; tympanum indistinct, almost hidden; usually with a chain of diamond shaped markings above .... *brunneus*

PHYLLOBATES BROMELICOLA Test

Figure 12

Phyllobates bromelicola Test, 1956, Occ. Pap. Mus. Zool. Univ. Mich., No. 577: 6: Pico Periquito, Rancho Grande, 1375 m.

1 (U.M.M.Z. 113029, paratype) Pico Periquito, Rancho
Grande, 1310 m.

Description. Snout short, truncate; tongue pyriform, half free, nicked behind; eye diameter greater than distance between eye and nostril but slightly shorter than snout; interorbital space little broader than upper eyelid; canthus angular; loreal vertical; tympanum distinct, ½ the eye diameter; two metacarpal tubercles, the outer divided and more extensive than the inner; subarticular tubercles indistinct, except in the first finger, where the only tubercle is rounded and slightly prominent; first finger considerably shorter than second, which is slightly shorter than fourth; larger disks smaller than the tympanum; two small metatarsal tubercles; toes free, their disks as large as those of the fingers; last toe feeble, shorter than third, and having the smallest disk of all; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth. Below, feebly granular on the throat, belly and thighs.

Color. Above, light yellowish brown or tan with considerable darker dusting (contracted melanophores); a dark brown canthal streak beginning at the tip of the snout and continuing posteriorly to the lumbar region; on the flanks the stripe diffuses ventrally and near the groin it narrows to a broad line that extends almost to the tip of the urostyle; a narrow white line above the brown band, from tip of snout, through margin of upper eyelid, to end of the brown band; loreal region below the lateral band and upper lip immaculate; two distinct, short, oblique bars on the proximal end of the thigh, the distal one extending anteriorly to the anterior aspect; another short bar on the middle of the tibia and other dusky, ill-defined ones on the ventral aspect of the tarsus and foot. Below, whitish, immaculate.

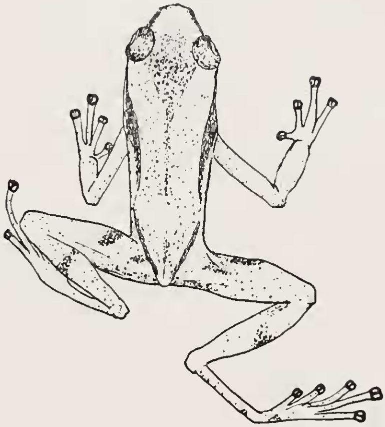

Fig. 12. *Phyllobates bromelicola* Test. Paratype U.M.M.Z. 113029.

Measurements. ♂, snout-vent 14.7; head length 5; head breadth 4.2; femur 7; tibia 7.

Habits. As its name implies, *P. bromelicola* lives and apparently breeds in bromeliads, and was never found by its author outside of the "tree pines."

Range. Only known from the upper slopes of Pico Periquito.

Remarks. In life, the color of the species is described as follows: "ground color of the dorsum is olive, bordered by a distinct white hairline; lateral band black; bars on thighs and shank black; tips of digits black; underparts bright yellow throughout . . ." (Test, *op. cit.*).

Superficially, *P. bromelicola* looks a lot like *P. nubicola flotator* Dunn, but in the latter species the first finger is longer than the second; the white dorsolateral line enters into and divides the lateral dark band at its posterior end, and the thighs do not have oblique bars on the upper surfaces. The enlarged third finger of the male *P. nubicola* has not been described for *P. bromelicola*.

PHYLLOBATES BRUNNEUS (Cope)

Prostherapis brunneus Cope, 1887, Proc. Amer. Philos. Soc., *24*: 54: Matto Grosso.

Prostherapis trinitatis Boettger, 1896, Ber. Senckenb. Naturf. Ges., 1895-6: LIV.

3 (U.M.M.Z. 113885:AB4464, 4497, 4842) nr. La Cumbre, Maracay-Turiano Rd.

1 (U.M.M.Z. 55548) Boquerón, Yaracuy.

Description. Snout truncate; tongue narrow, free, entire or slightly nicked behind; eye diameter slightly greater than distance between eye and nostril but shorter than the snout; interorbital space slightly greater than an upper eyelid; canthus angular; loreal vertical; tympanum indistinct, almost totally hidden, only the anteroventral margin showing, about ½ the eye diameter; metacarpal tubercles small but distinct; subarticular tubercles rounded, distinct; first finger longer than second when adpressed in the middle, second longer than fourth; a short, oblique tarsal fold; metatarsal tubercles small, the inner elongated, the outer conical; a short basal web between toes 2 and 3 and 3 and 4; disks of toes larger than those of the fingers; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with scattered tubercles at the posterior end, slightly rugose on the flanks. Below, smooth.

Color. Above, light yellowish brown or tan with a central, darker longitudinal band that widens and narrows a number of times and sometimes breaks into dots or scribblings at the sides; a broad, dark brown lateral band from tip of snout to groin; above this a whitish narrow line from behind the upper eyelid to groin; upper lip white; a dusky wedge-shaped bar at the anterior aspect of the forearm; no distinct white line on the flanks, within the brown lateral band; limbs cross-barred. Below, whitish, immaculate.

Measurements. Snout-vent ♂ 18, ♀ 18.5; head length ♂ 6, ♀ 6.5; head breadth ♂ 6, ♀ 6; femur ♂ 8.2, ♀ 8.2; tibia ♂ 8, ♀ 8.5.

Habits. A ground species inhabiting humid slopes (Test, 1956: 6).

Additional Localities. Mt. Marahuaca, 5000 ft. (U.P.R. 229-31, 250); La Culebra, 1000 ft. (U.P.R. 251); Alto Orinoco (Boettger, 1896); Río Guainía, Alto Orinoco (Senckenb. Mus. 7285 = Boettger, 1896).

Range. The Coastal Range and the Venezuelan Guayana. N. Colombia and British Guiana to Río de Janeiro.

Remarks. The tympanum in the Venezuelan examples is indistinct and almost hidden, but not totally concealed as described for the type specimen. The first finger is also described as equal to second and that is the way it looks if it is moved towards the second, but if both are adpressed in the middle of the two, the first appears longer. It also appears longer when the fingers are naturally separated.

The Coastal Range *Phyllobates brunneus* agrees with the description of *Phyllobates marchesianus* Melin in practically every respect. The dorsal longitudinal band of *brunneus* is not described for *marchesianus,* which is said to be brownish above, with indistinct black spots, but on the other hand, they both agree in having the first finger longer than the second (see above), a similar basic color, and in lacking a white line from groin to middle of flank. The two forms may prove to be conspecific.

U.P.R. 229-31, 250, 251 were originally referred to *P. marchesianus* and then to *P. brunneus* when no good characters were found to differentiate them from this species, except perhaps the longer first finger and the presence of an indistinct tympanum. As other specimens with typical *brunneus* coloration have a tympanum and a longer first finger, it was tentatively concluded that Cope's statement that the first finger is equal to the second in the type of *brunneus* may have resulted from his adpressing the first finger to the second in the position of the latter. instead of having them meet in the middle of the two. Regarding the tympanum, U.P.R. 251 has it definitely concealed while all the other specimens have it somewhat exposed.

In most of the U.P.R. specimens the "dorsal chain of diamonds" is not evident, and there is no whitish dorsolateral line in any. The latter may be the result of having the specimens for a few weeks in formalin after they were collected. However, they may not have had the line at any time. Their toe disks are also bigger than those from the Coastal Range material.

Melin, 1941, expressed doubt in allocating his slightly webbed *marchesianus* to a genus, and ended up by calling it *Phyllobates? marchesianus.* Unless different habits and habitats justify the separation, the division into the genera *Prostherapis* and *Phyllobates* should be reconsidered in the light of the more recently described forms. The division on the basis of presence or absence of web seems now untenable.

DENDROBATES LEUCOMELAS Steindachner

Dendrobates leucomelas Steindachner, 1864, Batrachol. Mittheil.: pl. xiii, figs. 1a-d: Colombia.

Dendrobates tinctorius Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

7 (U.P.R. 198-204) La Culebra, 1000 ft., iv.50.
1 (U.P.R. 205) Base Mt. Duida, 2000 ft. approx., vi.50.
2 (U.P.R. 206-7) Tapara, iv.50.

Description. Snout truncate; tongue narrow, entire and free; eye diameter equal to distance between eye and nostril; interorbital space flat, broader than an upper eyelid; canthus angular but not sharp; loreal slightly inclined inwards, not concave; tympanum moderate, its posterior margin somewhat hidden under a flat, indistinct fold that runs to the shoulder, about ⅔ the eye diameter; a large central metacarpal tubercle; subarticular tubercles round, moderate; fingers free, the first shorter than second; disks large, truncate and with converging margins; disk of the first toe distinctly smaller than the others; a short, oblique tarsal fold may be present or absent; two moderate metatarsal tubercles; toes free, their disks much smaller than those of fingers; heel of the adpressed hind limb extends to the tympanum. Skin above, smooth. Beneath, smooth on the throat and breast, slightly rugose on the belly and thighs.

Color. Above, bright yellow (in life), usually with a broad, black transverse band across the scapular region and another across the sacral region; the yellow spaces between the bands may have narrower bands or rounded or elongated black spots; limbs yellow, spotted with black; a black transverse band across the distal end of the tibia seems to be constant; posterior part of the thighs black, the color extending over the anus to the distal coccygeal region. Ventral surfaces solid black, sometimes with a lateral intrusion of yellow from above or with an occasional yellow spot.

Measurements. Snout-vent ♂ 31.5, ♀ 37; head breadth ♂ 10, ♀ 11; head length ♂ 9, ♀ 10; femur ♂ 14.5, ♀ 15.5; tibia ♂ 13.5, ♀ 15.

Habits. All the frogs were collected in rather shady places on the forest floor, on moist stones or on the mossy, water-dripping trunk of forest trees. The species is said to be common in all the Territorio Amazonas and someone informed me that he once saw a specimen inside a church in Ciudad Bolívar.

The Maquiritare Indians consider this *Dendrobates* sacred as one of them enters into the history of their good female deity Cawishowa. This did not prevent the Indians from capturing the frog or from using them to test the effectiveness of curare. If the animal dies, the drug is supposed to be sufficiently strong to kill warm-blooded prey.

The local name in Territorio Amazonas is "sapito minero" (miner's toad).

Additional Localities. Auyantepui (A.M.N.H. 46044-7, 46051); Yapacana (U.S.N.M. 83937-41); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana. Southeastern Colombia, British Guiana and N. Brasil.

Remarks. No difference was found between the Venezuelan specimens from different localities.

ATELOPODIDAE

Key to the Genera of ATELOPODIDAE *Reported from Venezuela*

I. Hand and foot adapted for grasping; first toe longer than second .... *Oreophrynella*

II. Hand and foot not adapted for grasping; first toe shorter than second .... *Atelopus*

Key to the Species of ATELOPUS *Reported from Venezuela*

I. Third finger shorter than distance between eye and tip of the snout; yellow or brownish; Mérida Andes .... *oxyrhynchus*

II. Third finger longer than distance between eye and tip of the snout; Coastal Range.

   A. Above, with a labyrinth of brown markings on a yellow or green background .... *c. cruciger*

   B. Above, uniformly yellow or brownish .... *c. vogli*

ATELOPUS OXYRHYNCHUS Boulenger

Atelopus oxyrhynchus Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *12*: 554: Río Albarregas, Culata, Sierra Nevada de Mérida, 10,000-11,000 ft.; Nieden, 1926, Das Tierreich. Anura II: 79; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 41.

2 (M.C.Z. 3804-5) Mérida.

Description. Snout flat, pointed, projecting considerably beyond the mouth; nostrils situated a little closer to the tip of the snout than to the eye; tongue narrow, entire and free; eye diameter slightly greater than distance between eye and nostril; interorbital space flat, much broader than an upper eyelid; canthus sharply angular, curved; loreal vertical, concave; tympanum absent; a faint, central, metacarpal tubercle; fingers free or with a short rudimentary web when viewed against a light; first finger very short and thick; subarticular tubercles almost imperceptible; tips of fingers slightly swollen; a faint outer metatarsal tubercle; toes about ½ webbed; subarticular tubercles of toes absent or very faint; heel of the adpressed hind limb extends to the shoulder or to the position of the tympanum. Skin above and on the sides of the body studded with small tubercles and large warts, especially on the posterior half of the body and on the limbs; temporal area and base of the forelimbs with small spiny tubercles; a ridge that commences as a bony ridge at the posterior corner of the eye extends posteriorly as a lateral row of glandules. Belly granular and rugose. Breeding male with longer and slightly enlarged arms and a brown rugosity on the inner side of the first digit.

Color. Lemon or brownish yellow with greenish upper eyelids; a brown streak that originates on the nostril extends posteriorly, passing the margin of the upper eyelids and marking the glandules of the lateral row. Small brown spots are indicated on the sides of the head of the male specimen. Boulenger describes a blotch of vermilion or orange red on the belly of some of his specimens, but in the material available the ventral surfaces are uniformly yellow.

Measurements. Snout-vent ♂ 40, ♀ 48; head breadth ♂ 11, ♀ 12.5; head length ♂ 13, ♀ 14; femur ♂ 17, ♀ 20; tibia ♂ 16, ♀ 17.

Additional Localities. La Carbonera, 7000 ft. (U.M.M.Z. 57403 [22]; U.S.N.M. 118676); La Culata (A.M.N.H. 10593-6); Mérida (U.M.M.Z. 58902 [5], 51268; C.N.H.M. 3625); Río Mucujún (C.N.H.M. 5646); Venezuela, 3000-4000 m. (Nieden, 1926 [cited from Boulenger, 1903?]).

Range. The subtropical zone and above in the Mérida Andes.

Remarks. U.M.M.Z. 58902 is a male with its natural color or most of it still existing. The ground color is brownish yellow and the larger dorsal tubercles are marked with brown; the lateral band is well defined at the canthus, but behind the eye it narrows and only borders the lateral row of warts; there is also a brownish drab on the temporal area and behind it the tubercles are also marked with brown. It is possible that the lateral band was broader in this region and faded out, leaving only the tubercles marked with brown. There are also some brown spots on the throat, chest and limbs. In U.M.M.Z. 58902 the brown lateral line is more continuous and better defined than in other specimens.

Irrespective of sex, there seems to be some variation in the form of the snout, which is very long and with a pointed tip in some specimens while in others the tip is rounder and shorter. The skin is sometimes smooth on the anterior half while in some individuals distinct tuberculation extends to the head.

Atelopus oxyrhynchus agrees with *Atelopus c. cruciger* in having a lateral row of warts, a brown, lateral band, spinulosity on the temporal area, tuberculation on the dorsal surface and a somewhat similar aspect. It differs from *Atelopus cruciger* in its much larger size, longer and more pointed snout, much shorter fingers and different coloration.

Atelopus planispina Espada appears to have a snout similar to *A. oxyrhynchus* but its coloration apparently resembles that of *A. c. cruciger* and it differs from *A. oxyrhynchus* in some important characters.

ATELOPUS CRUCIGER CRUCIGER (Lichtenstein and Martens)

Phrynidium crucigerum Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 41: Veragoa.

Phryniscus cruciger Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 44, pl. iii, fig. B.; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 154.

Phryniscus bibronii Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 137: Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 155: Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 39.

Atelopus spumarius Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 41, pl. xiii, figs. 27, 28.

Atelopus cruciger Nieden (part), 1926, Das Tierreich. Anura II: 84; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38; Müller, L., 1934, Zool. Anz., *108*: 151; Röhl, 1949, Fauna Descr. de Ven., ed. 2: 399, fig. 179.

Atelopus spumarius Alemán, 1952, Mem. Soc. Cienc. Nat. La Salle, *12*: 28, fig. 2.

2 (M.C.Z. 8657-8) Quebrada La Chapa, Nirgua.

5 (U.M.M.Z. 55556) Quebrada La Chapa, Nirgua.

9 (M.C.Z. 8659-61; U.M.M.Z. 55557) Sn. Esteban.
6 (M.C.Z. 17744-9) Cordillera Ocumare.
1 (U.M.M.Z. 68789) Campo Alto, nr. Maracay.

Description. Snout flat, subtriangular, obtusely pointed and projecting slightly beyond the mouth; nostrils closer to the tip of the snout than to the eye; tongue narrow, entire and free; eye diameter equal to distance between eye and nostril; canthus straight, sharply angular; loreal vertical, slightly concave; interorbital space flat, broader than an upper eyelid; a faint, round palmar tubercle; fingers practically free, except the first which has a short, basal web; first finger short and stout; subarticular tubercles of fingers very indistinct, of toes more distinct; fingers and toes with swollen tips; a flat, rounded, outer and a very indistinct inner metatarsal tubercle; first toe very short; toes ½ to ¾ webbed; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, studded with minute granules or tubercles and flat warts on the posterior third; a glandular row of warts from eye to groin. Below, areolate and rugose.

Color. Above, yellowish or green with a labyrinth of irregular, usually confluent, dark brown reticulations; one of the markings sometimes forms a large X at the nape; a brown lateral stripe from tip of the snout to groin; ventral surfaces of the limbs and flanks, below the lateral stripe, broadly marbled with brown; belly and throat yellowish white.

Measurements. Snout-vent ♂ 33.5, ♀ 32; head breadth ♂ 9, ♀ 8; head length ♂ 8, ♀ 9; femur ♂ 15, ♀ 15; tibia ♂ 16, ♀ 15.5.

Habits. This species occurs in great numbers in the proximity of streams and sometimes on plants up to a height of 1.5 m. (Roze).

Additional Localities. Curanna (Cumaná, Günther, 1858); Curupao (U.S.N.M. 117546-50); Curucuruma (U.C.V. 41); R. Chacaíto (U.S.N.M. 128877-81); El Hatillo (Alemán, 1952); Guamitas (U.C.V. 9); Los Canales (U.S.N.M. 128853-76, 117542-5); Between Maracay and Ocumare (U.S.N.M. 81137); Puerto Cabello (Günther, 1858; Boettger, 1893); Rancho Grande (U.S.N.M. 97196-97200; U.C.V. 54, 59-62, 64, 73, 80-1); Turgua (Alemán, 1952); Venezuela (Nieden, 1926).

Range. The Coastal Range from Yaracuy to Sucre.

Remarks. There seem to be two color varieties of this form, one of them as shown by Günther (1858, pl. III) is characterized by very close and fine reticulations on the dorsum, usually an X-shaped marking at the nape and another chevron-shaped marking at the sacral region. The other, as shown by Lutz (1927, pl. XIII) has a more broken pattern, there is no well defined X-shaped marking, and the basic color seems to be darker. Only the latter variety is found in Rancho Grande and in Nirgua and San Esteban but both are found in the M.C.Z. series from Cordillera Ocumare. The specimens from Guamita and Curucuruma have the fine pattern. The first is a large example, 42 mm. in length.

U.C.V. 64 is peculiar in being very dark, almost black above, and in having distinct broad marbling on the lower flanks and ventral portion of the limbs, and scattered dark spots on the belly and throat.

Although *Phrynidium crucigerum* was described from Veragua, Panamá, the alleged cotypes (Berlin Mus. 3387(3)) represent the Venezuelan species, which the original description also fits. It thus appears that the *A. cruciger* coming from Venezuela suffered an exchange of locality data with the *Eleutherodactylus gollmeri* coming from Panamá, with the result that *Eleutherodactylus gollmeri* was for a long time considered to have Caracas as its type locality, while *A. cruciger* was thought to be Panamanian. In this paper, the range of *Atelopus cruciger* is limited to the Coastal Range of Venezuela.

ATELOPUS CRUCIGER VOGLI Müller

Atelopus cruciger vogli Müller, L., 1934, Zool. Anz., *108*: 151: Las Peñas, nr. Maracay.

1 (U.M.M.Z. 92431, paratype) Las Peñas, nr. Maracay.

3 (M.C.Z. 20923-5, paratypes) Las Peñas, nr. Maracay.

Description. Atelopus c. vogli differs from the typical form in its more slender habit, slightly more projecting snout; longer and more slender inner finger; less webbed toes (⅓ to ½) and different coloration. The dorsal and ventral color is yellow, but, according to Müller, specimens with brownish dorsums and faintly indicated markings on the anterior part of the back are occasionally found. There is a lateral stripe along the flanks as in *A. c. cruciger*.

Measurements. Snout-vent ♂ 28, ♀ 36.5; head breadth ♂ 7, ♀ 9; head length ♂ 8, ♀ 10; femur ♂ 12, ♀ 16; tibia ♂ 13, ♀ 16.3.

Additional Localities. Las Peñas, Hacienda La Trinidad (U.S.N.M. 113265-6, 113268-74); near Maracay (U.S.N.M. 107328-33 paratypes).

Remarks. The only information I have been able to obtain about the habitat of this form was sent to me by Mr. J. Roze of Caracas, who obtained it through the courtesy of Padre Vogl, the collector. According to this note, *A. c. vogli* is found in a very inaccessible place to which it is necessary to climb by holding to vines and branches.

My examination of this form includes a series of 46 specimens, all of which are uniform yellow above. *Atelopus cruciger cruciger* is also of a plain color dorsally up to snout-vent lengths of 15 mm. (U.S.N.M. 128862-5); at 16.5 mm. snout-vent length (U.S.N.M. 128861) all the adult markings have appeared.

OREOPHRYNELLA QUELCHII QUELCHII (Boulenger)

Oreophryne Quelchii Boulenger, 1895, Ann. Mag. Nat. Hist., (6) *15*: 521: Summit Mt. Roraima, bet. Brit. Guiana and Venezuela, 8,500 ft.

Oreophrynella Quelchii Boulenger, 1895, Ann. Mag. Nat. Hist., (6) *16*: 125; 1900, Trans. Linn. Soc. London, (2) *8*: 55, pl. v, fig. 3.

Oreophrynella quelchii Nieden, 1926, Das Tierreich. Anura II: 75.

3 (M.C.Z. 3500-2, ctps.) Mt. Roraima, 8500 ft.
2 (M.C.Z. 24072-3) Roraima Plateau, 8000 ft.
1 (C.N.H.M. 43671) Mt. Roraima, 45.
1 (U.S.N.M. 118230) Roraima.

Description. Snout short, rounded; tongue narrow, entire and free; eye diameter almost as long as the snout; interorbital space as broad as an upper eyelid; canthus short and curved, well defined; loreal vertical or almost so; tympanum absent; two flat, rounded, metacarpal tubercles; palm and fingers with small, flat tubercles; fingers very short, distally swollen, the first shorter than second, which is slightly shorter than fourth; metatarsal tubercles very small; sole with small, flat tubercles; first three toes joined at the base and opposed to the other two, first longer than second; heel of the adpressed hind limb extends to the shoulder or near the eye. Skin above, including the upper eyelids and limbs densely tubercular; flanks tubercular; occasionally present, a longitudinal fold or ridge along the posterior part of the thigh. Belly granular.

Color. Above, very dark brown, almost black; loreal region usually smooth and shiny. Below, spotted or broadly marbled with yellow.

Measurements. Snout-vent ♂ 20, ♀ 21.5; head breadth ♂ 7, ♀ 7.5; head length ♂ 5.5; ♀ 6; femur ♂ 8.5, ♀ 8; tibia ♂ 7.5, ♀ 8.

Localities. The Museum of Zoology of the University of Michigan has 38 specimens from the Roraima Plateau. M.C.Z. has two from Roraima, Brasil.

Range. The Venezuelan, British Guianan and Brasilian summit of Mt. Roraima.

OREOPHRYNELLA QUELCHII MACCONNELLI Boulenger

Oreophrynella Macconnelli Boulenger, 1900, Trans. Linn. Soc. London, (2) *8*: 55, pl. v, fig. 1: Base of Mt. Roraima, 3500 ft.

Oreophrynella macconnelli Nieden, 1926, Das Tierreich. Anura II: 76.

No material examined.

Original Description. Distinguished from *Oreophrynella quelchii quelchii* by its more prominent snout, projecting much beyond the mouth and by the greater expansion of the digits which end in distinct truncate disks. Interorbital space broader than an upper eyelid; first toe much longer than second, as long as fourth; no distinct metatarsal or subarticular tubercles; first and second toes appear to be opposable to the fourth and fifth, both fascicles being bound by the thick integument, the third toe, which is the shortest, being free between them; tarso-metatarsal articulation of the adpressed hind limb extends to the eye. Skin above, covered with small, smooth, feebly prominent warts. Lower parts with flat granules.

Color. Above, brown with lighter marblings, and a series of small yellowish spots, forming a line on each side of the back from eye to groin, continued obliquely across the upper surface of the femur; upper lip yellowish, with two dark brown bars below the eye; lower parts whitish.

Measurements. Snout-vent 22.

Range. Only known from the type specimen.

Remarks. I treat this frog as a race of *Oreophrynella quelchii* on account of its close structural similarity to the nominate form (as expressed in the description), and also because one seems to represent the other at the higher elevations of Roraima and because no other member of the genus is known to occur in South America.

See remarks under *Otophryne robusta.*

RANIDAE

Rana palmipes Spix

Rana palmipes Spix, 1824, Spec. Nov. Test. Ran., 29, pl. v, fig. 1: Amazon; Boulenger, 1920, Proc. Amer. Acad. Arts Sci. (9)*55*: 473; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40, 47, pl. ix, figs. 7-9; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 161; Alemán, 1952, Mem. Soc. Cienc. Nat. LaSalle, *12*: 28, fig. 4.

Ranula Gollmeri Peters, 1859, Monatsb. Akad. Wissensch. Berlin: 402.

Rana affinis Peters, 1859, Monatsb. Akad. Wissensch. Berlin: 403; Cope, 1866, Proc. Acad. Nat. Sci. Philadelphia: 130.

1 (U.P.R. 226) Tapara, iv.50.

Description. Snout subovoid; tongue deeply notched behind; vomerine odontoids in two short or rounded, oblique and posteriorly convergent groups between the choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus distinct; loreal little sloping, deeply concave; tympanum large, ⅔ the eye diameter; subarticular tubercles round, distinct; first finger slightly longer than second; tips of fingers slightly dilated; one elongate, not very distinct, inner metatarsal tubercle; subarticular tubercles of toes elongated, distinct; toes fully webbed with the exception of the fourth which has about 2 free phalanges; tips of toes dilated into small disks; heel of the adpressed hind limb extends to a little beyond the anterior corner of the eye. Skin above and on the hind limbs tubercular; a pair of dorsolateral folds from posterior corner of the eye to groins.

Color. Above, olive, turning to green on the head (in life); anterior and posterior aspects of the thighs black and light marbled; limbs crossbarred; below, yellowish and black marbled.

Measurements. ♀ Snout-vent 50; head breadth 18.3; head length 21; femur 22; tibia 24.

Habits. The only specimen was caught very early in the morning, half submerged in the waters of the Cunucunuma River. The species does not seem to be common in the region.

Additional Localities. Arabopó (U.M.M.Z. 85207-8); Baruta (Alemán, 1952); Bejuma (U.M.M.Z. 55586); Bermúdez St. (C.N.H.M. 17772-4); Caracas (Peters, 1859); Caserío Silva; Cumanacoa (Schmidt, 1932); El Hatillo (Alemán, 1952); Río Lamona (U.M.M.Z. 55576); Maracay (Lutz, 1927); Nirgua, Laguna de los Coronjos (U.M.M.Z. 55577-8); San Féliz, Estación Táchira (U.M.M.Z. 55579); Tributary of Río Uribante (U.M.M.Z. 85111); Venezuela (U.M.M.Z. 85176; Cope, 1866).

Range. The base of the Mérida Andes, the Coastal Range, the Venezuelan Guayana and probably all the other physiographical provinces of Venezuela. Central America and Trinidad to Perú and Matto Grosso. *Rana palmipes hoffmanni* Müller, 1924, has been described from Costa Rica and *Rana palmipes rionapensis* Andersson, 1945, from Ecuador. *Rana brevipalmata rhoadsi* Fowler, 1913, is considered a synonym.

Remarks. A female specimen with a snout-vent length of 122 mm. has been examined. The heel may extend to between eye and nostril or to the nostril, while the tympanum may be as much as ⅞ the eye diameter. A few specimens are salmon-colored below.

Specimen C.N.H.M. 17773 is probably a male, with a tympanum ¾ the eye diameter and an infuscated throat. It has the following measurements: snout-vent 66; head breadth 25; head length 28; femur 31; tibia 36.

Cope's "*Ranula* sp. nov., O. Salvin; Vera Paz, Venezuela," which was listed immediately following his *Ranula affinis,* was presumably *Rana palmipes.*

MICROHYLIDAE

Key to the Genera of Venezuelan Microhylidae

I. Clavicle and procoracoid reduced, the former not extending to the scapula and confined to the mesial portion of the procoracoid . . . . *Elachistocleis*

II. Clavicle and procoracoid extending from midline of girdle to scapula .... *Otophryne*

ELACHISTOCLEIS OVALIS (Schneider)

Rana ovalis Schneider, 1799, Hist. Amphib.: 131 (type loc. not cited).

7 (U.P.R. 219-225) Puerto Ayacucho, vi.50.

Description. Head triangular; snout pointed, about 1⅔ longer than the eye diameter, projecting considerably beyond the mouth; tongue attached anteriorly and behind but loose in the middle; eye diameter shorter than distance between eye and nostril; interorbital space more than twice as broad as an upper eyelid; canthus absent; loreal slightly oblique; tympanum hidden; three small, indistinct metacarpal tubercles; fingers short, the first shorter than second, which is very little shorter than fourth; one inner metatarsal tubercle, no outer; toes free; subarticular tubercles flattened; heel of the adpressed hind limb does not reach the shoulder. Skin above, smooth; a transverse fold behind the eyes; a flat oblique fold from posterior corner of eye to shoulder. Below, smooth.

Color. Above, black with minute light points; flanks and ventral surfaces gray, marbled or spotted with orange; a large orange spot at the groin and proximal portion of the thigh; another broad, orange spot along the posterior aspect of the thigh and hidden portion of the tibia; smaller orange spots are present on their margins; throat darkened in the male.

Measurements. Snout-vent ♂ 30.5, ♀ 37; head breadth ♂ 8, ♀ 7.5; head length ♂ 6, ♀ 7; femur ♂ 11.5, ♀ 7; tibia ♂ 11, ♀ 8.

Additional Localities. Espino (U.C.V. 47); Palenque (U.S. N.M. 128847-9); Sta. Elena, 3500 ft., Bolívar (U.M.M.Z. 85143).

Remarks. I find no difference between the Puerto Ayacucho specimens and two paratypes of *Hypopachus pearsei* Ruthven, from Fundación, Colombia (M.C.Z. 3727, 6075). A large, 55 mm. specimen collected by Dr. P. J. Darlington in Río Frío, Colombia, however, has a longer snout that is slightly greater than twice the eye diameter. The spotting on the flanks, groins and thighs of all these specimens is very similar to M.C.Z. 2037 from Surinam. U.M.M.Z. 85143, U.S.N.M. 128847-9 and U.C.V. 47 from Venezuela, as well as M.C.Z. 4089 from Trinidad, have a narrow, well-defined line on the posterior part of the thighs. The Trinidad specimen appears to have very long legs, probably because of its desiccated condition, but groin and ventral spots are still obvious. U.C.V. 47 has ventral spots, small spots under the femoral line and groin spots. U.M.M.Z. 85143 has groin spots, probably scattered spots underneath (very desiccated) and no spot surrounding the femoral line, while the U.S.N.M. specimens are very small and dry and the ventral coloration cannot be detected. I am inclined to believe that there is some variation in the form of the femoral line but that *Elachistocleis pearsei* and *E. ovalis* are conspecific.

The Museum of Comparative Zoology has 8 specimens from Buenavista, Bolivia, 6 of which fall into the description of *E. bicolor* while 2 have small yellow spots below, an inguinal spot, and on one of them, a broad femoral line. *E. bicolor* has a brown or orange belly that is surrounded by yellow on the throat, sides of the belly and lower flanks, thighs and tibiae. The upper lip also has a yellow margin that extends posteriorly to the shoulder. One of the specimens is 33 mm., another 32, while the others are smaller. In the same lot, a specimen (M.C.Z. 15686) with uniformly yellow ventral surfaces appears to have small spots on the slightly darkened throat. In M.C.Z. 12862, from Bolivia, which should be *E. ovalis* as there are groin and ventral spots (small) below, the sides of the darkened throat (♂) are yellow and the femoral line narrow, reminiscent of the condition in *E. bicolor*. I believe these forms need further study; the fact that the two color variations exist in Bolivia should not be definitely interpreted to mean that the two are full species as this is a region where intergradation of other forms is known to occur. Cei (1956) has already used the name *E. ovalis bicolor* for the Argentinian form.

Measurements. ♂ Snout-vent 54; head breadth 19; head length 18; femur 22.5; tibia 22.

Additional Localities. Arabopó (U.M.M.Z. 85136, 85138).

Range. Mt. Roraima region of Venezuela, British Guiana and probably Brasil. U.M.M.Z. 85139-40 are from the Kurupung R. in British Guiana.

Remarks. The specimens were dry and stiff so that the limbs could not be adpressed to the sides. According to Boulenger the tarso-metatarsal articulation extends to the tympanum.

Phelps (1938b) has demonstrated that, of the several expeditions that visited Mt. Roraima, only the second expedition by McConnell and Quelch could have collected in the small British Guianan segment of the summit plateau. Specimens from 3500 ft. come, however, from Venezuelan territory.

OTOPHRYNE ROBUSTA Boulenger

Otophryne robusta Boulenger, 1900, Trans. Linn. Soc. London, *8*: 55, pl. v, fig. 5: Mt. Roraima, 3500 ft., "British Guiana" (in error for Venezuela); Nieden, 1926, Das Tierreich. Anura II: 73; Parker, 1934, Monogr. Fa. Microhylidae (London): 109.

1 (U.M.M.Z. 85137) Arabopó.

Description. Snout obliquely truncate; tongue oval, entire and free behind; two well defined, crenulated ridges in front of the pharynx; eye diameter slightly longer than distance between eye and nostril but shorter than the snout; interorbital space much broader than an upper eyelid; canthus angular; loreal vertical, slightly concave; tympanum disproportionately large, much larger than the eye, with which it is in contact; a fine supratympanic fold from posterior corner of eye to shoulder and a lateral fold from this to inguinal region; metacarpal tubercles indistinct; subarticular tubercles absent or only faintly indicated; fingers free, the first shorter than second which is shorter than fourth; outer toe very short; metatarsal tubercles absent; toes distally spatulate, about ½ webbed, the web extending to the tips as conspicuous lateral fringes. Skin above and below, smooth.

Color. Above, very dark brown, obscurely spotted with darker; groins and posterior aspect of the thighs spotted with yellowish or orange and black. Ventral surfaces of the belly and limbs dirty white, with scattered brown spots; throat and chest dark brown.

LOCALITIES

The following is a list of Venezuelan localities in which frogs have been collected, and a few others mentioned in the text which may be difficult to find. The descriptions are taken from the literature or from personal observation. The equivalents of abbreviations are given below:

H. Temp. = Highest, average, median temperature (C).
L. Temp. = Lowest, average, median temperature (C.).
Ann. Temp. = Average, annual, median temperature (C.).
H. Rain. = Highest, average, median rainfall (mm.).
L. Rain. = Lowest, average, median rainfall (mm.).
Ann. Rain. = Average, annual, median rainfall (mm.).

1. Acarigua, Edo. Portuguesa — 9°33′27″N., 69°11′54″W. — Elev. 186 m. — H. Temp., Mar. (28.5°), L. Temp., Jul. (25.6°), Ann. Temp., 26.8° — H. Rain., Jun. (287), L. Rain., Feb. (5), Ann. Rain. 1503.
2. Acosta, Distrito, Edo. Falcón — In the northeastern part of Falcón, between Zamora and Silva.
3. Albarregas, Río, Edo. Mérida — Río Chama system, with headwaters in Sierra La Culata and mouth above Mérida.
4. Altagracia de Orituco, Edo. Guárico — 9°12′30″N., 66°00′00″W. — Elev. 358 m. — H. Rain., Aug. (168), L. Rain., Feb. (1), Ann. Rain. 913.
5. Amana, Río, Edo. Monagas — Tributary of Río Guanipa. with headwaters in the Coastal Range and mouth 60 km. east of Maturín.
6. Anabén, Colombia — 4°4′N., 67°44′W. approx. — Elev. about 100 to 150 m. A small Colombian village at the angle formed by the Atabapo with the Inírida. Most frogs collected in tall grass some 200 yards from the river (Atabapo) edge or in a cacao planting nearby.

7. Antímano, D. F. — 10°28′N., 66°58′W. approx. — Elev. 928 m.
8. Apure, Río — Large tributary of the Orinoco on the western Llanos.
9. Agüita Waterfalls, Terr. Amaz. — Elev. 988 m. A camp on a 45° slope of Mt. Duida. Conditions, subtropical.
10. Arabopó, Edo. Bolívar — 5°2′30″N., 62°42′30″W. approx. — Elev. 1,216 m. A village at the base of Cerro Roraima, on the valley of Río Arabapó. The river begins with a cascade in the southwestern cliff of Roraima and joins the Cuquenán River some 20 miles to the south. The valley is broad, chiefly savanna covered and bordered on both sides by rolling hills but at about a mile north of the village the grassland terminates. The border of the Weitipú forest, stretching for some 10 miles to the northern slopes of Cerro Weitipú, lies ½ hour walk to the southeast. The extensive forests of Arabopó, starting from the foothills of Roraima, curve around the northern end of the valley and around the ridge reaching southwest to Weitipú. In addition, forest growth occurs in deep valleys and along the margins of streams (Chapman).
11. Aragua de Barcelona, Edo. Anzoátegui — 9°27′29″N., 64°49′33″W. — Elev. 96 m. — H. Temp., Apr. (28°), L. Temp., Jan. (24.9°), Ann. Temp. 26.2° — H. Rain., Aug. (208), L. Rain., Feb. (2), Ann. Rain. 1,030.
12. Aroa, Edo. Yaracuy — 10°26′N., 68°54′50″W. approx. — Elev. around 370 m. On the valley of Río Aroa. This is dry and the native vegetation has been mostly destroyed. Some rocky "quebradas" occur near the town (Williamson).
13. Auyantepui, Cerro, Edo. Bolívar — 5°48′N., 62°33′W. — Elev. 2,400 m. One of the sandstone mesas of the Guayana Highlands. The southern slopes are mostly treeless to 2,000 m. but otherwise the zones are usually well defined, the transitional slopes being narrow or absent (Tate).
14. Avila, Cerro, D. F. — In the vicinity of Caracas. Frogs collected in the forest on the margins of streams between 1,800-2,200 m. Above 1,500 m. the forest is subtropical (Roze).
15. Barcelona, Edo. Anzoátegui — 10°08′06″N., 64°41′05″W. — Elev. 10 m.
16. Barinas, Edo. Barinas — 8°37′49″N., 70°12′10″W. — Elev. 180 m. — H. Temp., Mar. (27.1°), L. Temp., Sept., Oct.

(26.0°), Ann. Temp. 26.6° — H. Rain., Jun. (364), L. Rain., Jan. (11), Ann. Rain. 1,863.

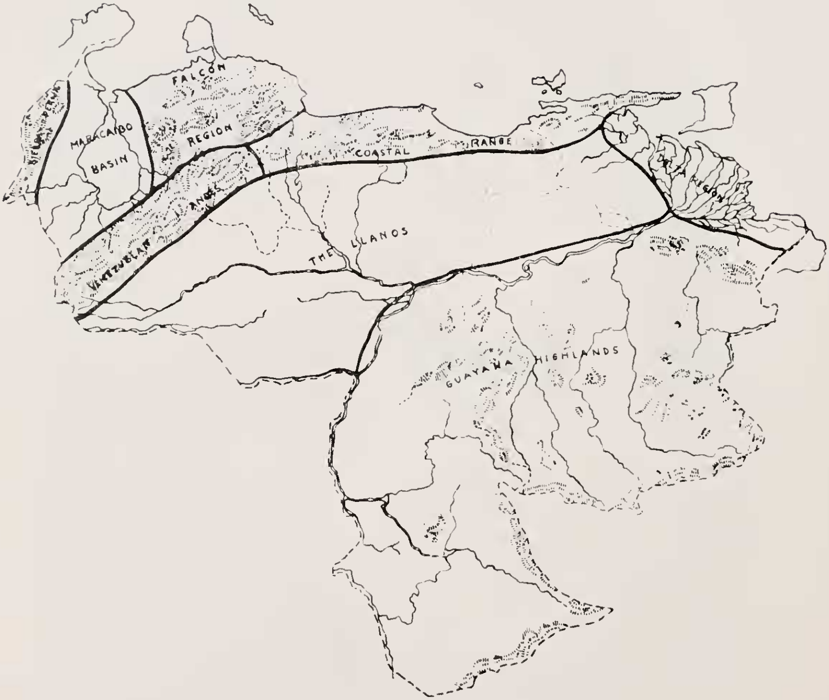

Fig. 13. Faunal regions in Venezuela.

17. Barquisimeto, Edo. Lara — 10°03′57″N., 69°18′45″W. — Elev. 566 m. — H. Temp., Nov. (24.9°), L. Temp., Jan., Jun. (23.6°), Ann. Temp. 24.2° — H Rain., Feb. (5), Ann. Rain. 519 Conditions, xcrophilous.
18. Barrancas, Edo. Monagas — 8°42′30″N., 62°11′W. approx. — Elev. not more than 100 m.
19. Baruta, Edo. Miranda — Between Caracas and El Hatillo. Elev. around 1,100 m. Conditions, subtropical.
20. Bejuma, Edo. Carabobo — 10°10′00″N., 68°17′00″W. — Elev. 662 m. — Ann. Temp. 23.9°, H. Rain., May (279), L. Rain., Feb. (2), Ann. Rain. 1,208. In a circular plain surrounded by high hills. Most of the valley of Río Bejuma and the steep surrounding hills are generally under cultivation. "Quebradas" in the hills are usually surrounded by luxuriant growth (Williamson).

21. Bermúdez State — Old Venezuelan state that included the present Anzoátegui, Sucre and Monagas.
22. Boca de Río, Edo. Aragua — 10°17′47″N., 67°38′25″W. — Elev. 415 m. — H. Temp., Apr. (26.0°), L. Temp., Jan. (23.8°), Ann. Temp. 24.9° — H. Rain., Aug. (161), L. Rain., Jan. (1), Ann. Rain. 821.
23. Bonicito, Río, Edo. Zulia — A small river in the Maracaibo District.
24. Caicara, Edo. Bolívar — 7°38′N., 66°14′W. — Elev. around 60 m.
25. Caju, Caño, Terr. Amaz. — A swift running stream at the base of the vertical wall of Marahuaca. Conditions, upper tropical but vegetation is not thick and the trees not high. Collections from about 1,200 m.
26. Calabozo, Edo. Guárico — 8°56′06″N., 67°25′00″W. — Elev. 106 m. — H. Temp., Apr. (29.2°), L. Temp., Jul., Aug. (26.6°), Ann. Temp. 27.5° — H. Rain., Jun. (322), L. Rain., Jan. (1), Ann. Rain. 1,303.
27. Campo Alto, Edo. Aragua — Apart from the fact that it is near Maracay, little has been learned about this locality.
28. Caracas, D. F. (center of city) — 10°30′30″N., 66°54′50″W. — Elev. 920 m. — H. Temp. (at Observatorio Cagigal) May (21.5°), L. Temp., Jan. (18.8°), Ann. Temp. 20.4° — H. Rain., Oct. (139), L. Rain., Feb. (7), Ann. Rain. 897.
29. Carapa, Edo. Anzoátegui — 8°21′N., 63°16′W. approx. — Elev. not more than 100 m.
30. Carayaca, D. F. — 10°32′N., 67°07′W. — Elev. 500 m. approx. Conditions, tropical to subtropical. Frogs collected in the surroundings of a small lake (Roze).
31. Caripito, Edo. Monagas — 10°07′11″N., 53°05′26″W. — Elev. 50 m. approx. — Ann. Temp. 26.1° — H. Rain., Jun. (305), L. Rain., Feb. (39), Ann. Rain. 2,182.
32. Carora, Edo. Lara — 10°11′07″N., 70°15′31″W. — Elev. 420 m. — H. Temp., Jun. (28.7°), L. Temp., Mar. (25.6°), Ann. Temp. 27.7° — H. Rain., Oct. (144), L. Rain., Feb. (11), Ann. Rain. 632.
33. Casa de Julián, Terr. Amaz. — Two houses and an Indian plantation or ''conuco'' in the middle of the jungle between Tapara and Caño Chana. Frogs collected in the ''conuco'' at 609 m. or in the margins of a nearby stream at approximately the same elevation. Conditions, tropical.

34. Caserío Silva, Edo. Carabobo—A "posada" between Valencia and Bejuma. The place is situated on the margin of a small, clear stream (Río La Mona) which is generally in the sun but in some places has a little forest remaining along it (Williamson).
35. Casiquiare Canal, Terr. Amaz. — The famous branch of the Upper Orinoco that connects with the Amazon through Río Negro. Conditions, mostly humid tropical.
36. Casurua, Terr. Amaz. — An abandoned hut and "conuco" on the northern margin of Río Cunucunuma, about 5 hours by motor boat from the mouth of the river. Soil sandy and vegetation not very luxuriant. Estimated elevation, about 300 m.
37. Chacaito, Quebrada, D. F. — A stream at the eastern boundary of Distrito Federal. Elev. 960-1,000 m.
38. Chana or Chanane, Caño, Terr. Amaz. — A stream between Casa de Julián and Cerro Marahuaca. Conditions, humid tropical. Collections come from the surrounding forest at an elevation of 781 m.
39. Chama, Río, Edo. Mérida — A river that originates in the vicinity of Páramo de Mucuchíes, runs between Sierra La Culata and Sierra Nevada de Mérida and empties into one of the ciénagas on the south of Lake Maracaibo.
40. Chupadero, Chorro, Terr. Amaz. — A small stream that empties into the eastern side of Río Orinoco at about 6 or 7 hours by motor boat up the river from San Fernando de Atabapo. Heavy tropical vegetation on all sides.
41. Ciudad Bolívar, Edo. Bolívar — 8°08′52″N., 63°33′06″W. — Elev. 54 m. — H. Temp., Sept. (28.3°), L. Temp., Jan. (26.5°), Ann. Temp. 27.5° — H. Rain., Jul. (186) L. Rain., Mar. (8), Ann. Rain. 1,022.
42. Cocollar, Edo. Sucre — 10°10′00″N., 63°47′00″W. — Elev. 835 m. H. Rain., Oct. (159), L. Rain., Feb. (17), Ann. Rain. 1,137. Almost arid in the dry season, the area produces a coarse, low grass and usually low trees (Tate).
43. Cocuhy, Río — I have been unable to find this locality in Venezuela. Cucuy or Cocuy is a place in the southwestern corner of Venezuela and perhaps there is a nearby river of the same name.
44. Colonia Tovar, Edo. Aragua — 10°24′38″N., 67°17′03″W. — Elev. 1,790 m. — H. Temp., May (16.3°), L. Temp., Jan. (14.1°), Ann. Temp. 15.4° — H. Rain., Aug. (188), L. Rain., Feb. (14), Ann. Rain. 1,300.

45. Coro, Edo. Falcón — 11°24′48″N., 69°40′42″W. — Elev. 21 m. — H. Temp., Sept. (29.9°), L. Temp., Jan. (27.1°), Ann. Temp. 28.4° — H. Rain., Nov. (100), L. Rain., Feb. (14), Ann. Rain. 442.
46. Cosme, Cerro, Edo. Falcón — 10°53′N., 68°41′W. approx. — Elev. probably 250-300 m.
47. Cotiza, Río, Camino de Galipán, D. F. — Granja Cotiza is near Caracas at an elevation of 900 m. Conditions, subtropical (Chardón).
48. Cúa, Edo. Miranda — 10°09′42″N., 66°53′20″W. — Elev. 241 m. — H. Rain., Jun. (218), L. Rain., Feb., Mar. (5), Ann. Rain. 959.
49. Culata, Edo. Mérida — See La Culata.
50. Cumaná, Edo. Sucre — 10°27′47″N., 64°10′37″W. — Elev. 3 m. — H. Temp., Oct. (27.6°), L. Temp., Jan. (25.7°), Ann. Temp. 26.9° — H. Rain., Aug. (64), L. Rain., Feb., Mar. (4), Ann. Rain. 375.
51. Cumanacoa, Edo. Sucre — 10°15′00″N., 63°55′10″W. — Elev. 240 m. — Ann. Temp. 24.7° approx. — H. Rain., Aug. (223), L. Rain., Feb. (17), Ann. Rain. 1,336. In the valley of Río Manzanares. The floor of the hill encircled valley is level and apparently formed by sedimentation. Most of the area is under cultivation (Tate).
52. Cumarebo, Edo. Falcón — 11°29′25″N., 69°21′26″W. — Elev. 13 m.
53. Cunucunuma, Río, Terr. Amaz. — A tributary of the Orinoco with its mouth at about 250 km. up the river from San Fernando de Atabapo. Except for an occasional small savanna or "conuco," the margins of the Cunucunuma are heavily forested from its mouth to Tapara and probably farther up.
54. Cuquenán, Cerro, Edo. Bolívar — The second largest of Mt. Roraima mountains. Elev. 2,584.
55. Cuquenán, Valley, Edo. Bolívar — Valley of Río Cuquenán, an upper tributary of Río Caroní, with headwaters in Mt. Roraima.
56. Curucuruma, Edo. Aragua — Elev. 1,000 m. approx. Conditions, subtropical (Roze).
57. Curupao, Edo. Miranda — 10°30′00″N., 63°38′18″W. — Elev. 420 m. — H. Rain., Jun. (155), L. Rain., Mar. (5), Ann. Rain. 1,082. At 1,120 m. H. Rain., Sept. (159), L. Rain., Mar. (18), Ann. Rain. 1,305.

58. Distrito Federal — District in which the capital city of Venezuela is located.
59. Duida, Cerro, Terr. Amaz. — A sandstone cerro on the southern margin of Río Cunucunuma. See Esmeralda, Agüita Waterfalls, Caño Pescado, and La Culebra.
60. Egido, Edo. Miranda — 8°32′45″N., 71°15′17″W. — Elev. 1,167 m. — Ann. Temp. 22.6° — H. Rain., Nov. (176), L. Rain., Jan. (23), Ann. Rain. 984.
61. El Baúl, Edo. Cojedes — 7°05′57″N., 68°17′01″W. — Elev. 102 m. — H. Rain., Jun. (402), L. Rain., Feb., Mar. (0), Ann. Rain. 1,662.
62. El Hatillo, Edo. Miranda — 10°27′N., 66°54″W. approx. Elev. around 1,100 m.
63. El Junquito, D. F. — Elev. 1900-2100 m. Conditions, subtropical, except in the higher elevations where only grass and low shrubs occur.
64. El Limón, D. F. — 10°28′N., 67°18′W. approx. — Elev. 577 m. — Ann. Temp. 22.2° — H. Rain., Oct. (204), L. Rain., Feb. (33), Ann. Rain. 1,477.
65. El Mene de Acosta, Edo. Falcón — 11°00′30″N., 68°31′00″W. approx. Elev. not more than 100 m.
66. El Mene de Buchivacoa, Edo. Falcón — 10°43′N., 71°00′W. approx. Elev. not more than 100 m.
67. El Periquito, Cerro, Edo. Monagas — 10°13′N., 63°41′W. — Elev. 500 m. approx. Conditions, tropical to subtropical.
68. El Sombrero, Edo. Guárico — 9°23′10″N., 67°03′17″W. — Elev. 160 m. — H. Rain., Jul. (252), L. Rain., Feb., Mar. (0), Ann. Rain. 1,205.
69. El Valle, D. F. — 10°29′07″N., 66°50′52″W. — Elev. 885 m. — H. Temp., May (21.7°), L. Temp., Jan. (19°), Ann. Temp. 20.7° — H. Rain., May (117), L. Rain., Feb. (5), Ann. Rain. 797.
70. Encontrados, Edo. Zulia — 9°04′30″N., 72°18′00″W. approx. In the humid, tropical plain southwest of Lake Maracaibo.
71. Escorial, Edo. Mérida — 8°42′N., 72°02′W. approx. — Elev. 2,500 m. and up. Mammals have been collected above timber line at 3,000 m.
72. Esmeralda, Terr. Amaz. — An abandoned native hacienda at about 50 km. up the Orinoco from the mouth of Río Cunucunuma. Located on a mostly flat, grassy savanna with occasional low, swampy areas.
73. Espino, Edo. Guárico — 8°34′N., 66°01′W. — Elev. about 200 m. — Specimens collected in gallery forest at the margin of a stream (Roze).

74. Gé, Río, Edo. Zulia — Tributary of Río Palmar, near Villa del Rosario, west side of Lake Maracaibo.

75. Guachi, Río, Edos. Mérida and Zulia — The Río Guachi arises in the northwestern slopes of the Andes and empties into the southern end of Lake Maracaibo, some 12 miles east of the mouth of Río Chama (Osgood and Conover).

76. Guamitas, Parque Nacional, Edo. Aragua — Elev. 700 m. approx. Conditions, tropical to subtropical.

77. Hiquerote, Edo. Miranda — Collections come from the surroundings of the many rivulets and channels that connect with the sea in this area (Roze).

78. Jacaré, Terr. Amaz. — A small Indian village on the northern margin of Río Cunucunuma between Casurúa and La Culebra. Conditions, heavy tropical.

79. Kukenam — See Cuquenán.

80. Kunana, Edo. Zulia — Savanna on the southern side of Río Negro, Perija Range. Elev. 1100 m.

81. La Azulita, Edo. Mérida — 8°42′03″N., 71°25′32″W. — Elev. 1,135 m. — H. Rain., Jun. (197), L. Rain., Jan. (42), Ann. Rain. 1,398. Village on west side of Río Guachi. Some of the surrounding country is cleared for the production of sugar and coffee, but most of it is heavily forested. Conditions, humid tropical to subtropical (Osgood and Conover).

82. La Carbonera, Edo. Mérida — 8°37′30″N., 71°21′00″W. approx. — Elev. 2,128 m. An "hacienda" at the northeastern slopes of Páramo Tambor, near the headwaters of a western branch of Río Guachi. Temperate forest and open cleared meadows prevail (Osgood and Conover).

83. La Chapa, Quebrada, Edo. Carabobo — A stream near the town of Miranda. Collections come from the wooded ridges at 1,109 m.

84. La Cruz Pruviera, Edo. Guárico — I have been unable to obtain any information about this locality. Specimens from this place were collected by Dr. Henri Pittier.

85. La Culata, Edo. Mérida — A sierra of the Mérida Andes extending for 80 km. between Páramo de Chequé (3894 m.) to La Cuchilla (2.475 m.). A páramo (440 m.) in the above mentioned sierra.

86. La Culebra, Edo. Miranda — At about 30 km. in straight line from El Junquito but separated from this locality by two large and deep valleys. Although the approximate

elevation is 1,800 m., the conditions are mostly tropical due to its location in the Internal Range where the trade winds are little felt (Roze).

87. La Culebra. Pico. Terr. Amaz. — An eastern peak of Mt. Duida rising from Savanna La Culebra at 334 m. and reaching an approx. elev. of 1398 m. Talus forest to 1000 m. where the subtropical forest commences. At about 1340 m. trees disappear and the terrain is characterized by loose rocks, among which a small, spiny pineapple grows abundantly.
88. La Culebra, Savanna, Terr. Amaz. — Savanna at the base of Pico La Culebra. Elev. 334 m.
89. La Fría, Edo. Táchira — 8°13′N., 72°19′W. approx. — Elev. 140 m. The forest to the south of the town consists of a heavy, mixed growth; to the north the terrain is nearly flat with occasional, muddy and swampy spots, and to the east there is a sandy "quebrada" with a good flow of water (Williamson).
90. La Guaira, D. F. — 10°30′48″N., 66°56′02″W. — Elev. 5 m. — H. Temp., Sept. (28.1°), L. Temp., Jan., Feb. (25.2°), Ann. Temp. 26.8° — H. Rain., Nov. (104), L. Rain., Apr. (17), Ann. Rain. 553. Conditions, arid and semiarid but mountains rise to 900 m. immediately behind the town and constant precipitation in them produces a number of streams that are followed by some forest growth along their course to the sea.
91. Lagunillas, Edo. Zulia — 10°07′20″N., 71°15′30″W. — Elev. 5 m. H. Temp., Oct. (28.8°), L. Temp., Jan. (27.5°), Ann. Temp. 28.3° — H. Rain., May (125), L. Rain., Jan. (7), Ann. Rain. 900. Village on the eastern shore of Lake Maracaibo. Behind the village there is an extensive, shallow lagoon or ciénaga filled with water plants and bordered by rushes and mangroves. The surrounding country is arid to semiarid (Osgood and Conover).
92. La Mona, Río, Edo. Carabobo — See Caserío Silva.
93. La Pascua, Edo. Guárico — 9°12′30″N., 66°01′00″W. approx. — Elev. 195 m.
94. Las Peñas, Ravine, Edo. Aragua — Near Maracay. See remarks under *Atelopus cruciger vogli.*
95. Las Quiggas, Edo. Carabobo — A village on Río San Esteban and a stream that passes by (Williamson).
96. La Trinidad, Hacienda, Edo. Aragua — 10°21′10″N., 67°36′07″W. — Elev. 455 m. — H. Rain., Aug. (185), L. Rain., Feb. (1), Ann. Rain. 984.

97. La Trinidad, Edos. Sucre-Monagas — A coffee plantation in Mt. Turumiquire at an elevation of 6000 ft. Conditions, subtropical.
98. Los Canales, Planta Eléctrica de Naiguatá — I have been unable to obtain information about this locality.
99. Los Coronjos, Laguna, Edo. Yaracuy — A lagoon in Nirgua.
100. Los Teques, Edo. Miranda — 10°24′48″N., 67°02′02″W. — Elev. 1169 m. — H. Rain., Jun. (161), L. Rain., Mar. (10), Ann. Rain. 1,126.
101. Los Venados, D. F. — 10°32′28″N., 66°53′66″W. — Elev. 1,524 m. — Ann. Temp. 9.2° — Ann. Rain. 716.
102. Macuto, D. F. — 10°36′50″N., 66°53′00″W. approx. Three miles east of LaGuaira. It is said to present a most fertile and flourishing character (Robinson and Lyon).
103. Machiques, Edo. Zulia — 10°03′18″N., 72°23′49″W. — Elev. 150 m. — H. Rain., Oct. (241), L. Rain., Jan. (8), Ann. Rain. 1,519.
104. Manamo, Caño, Delta Amacuro — Channel that forms the boundary between Monagas State and the Delta Amacuro Territory.
105. Maracaibo, Edo. Zulia — 10°38′32″N., 71°36′26″W. — Elev. 6 m. — H. Temp., Aug. (29.4°), L. Temp., Jan., Feb. (27.4°), Ann. Temp. 28.3° — H. Rain., Oct. (149), L. Rain., Feb. (0), Ann. Rain. 573. Conditions, arid.
106. Maracay, Edo. Aragua — 10°15′17″N., 67°35′57″W. — Elev. 445 m. — H. Temp., Apr. (26.2°), L. Temp., Jan. (23.7°), Ann. Temp. 24.7° — H. Rain., Aug. (170), L. Rain., Jan. (1), Ann. Rain. 858.
107. Marahuaca, Cerro, Terr. Amaz. — One of the Guayanan Cerros, constituting with the Duida and Huachamacari, a distinct triangle at the western end of the Pacaraima System. Conditions tropical to about 1231 m., where a subtropical pocket occurs on the northern side. Elev. 2581 m.
108. Maturín, Edo. Monagas — 9°44′30″N., 63°10′30″W. — Elev. 75 m. — H. Temp., Apr. (26.8°), L. Temp., Jan. (24.5°), Ann. Temp. 25.7° — H. Rain., Jun. (208), L. Rain., Mar. (18), Ann. Rain. 1,248.
109. Mérida, Edo. Mérida — 8°35′56″N., 71°09′24″W. — Elev. 1,623 m. — H. Temp., Aug. (19.7°), L. Temp., Jan. (18.2°). Ann. Temp. 19.2° — H. Rain., Sept. (273), L. Rain., Feb. (45), Ann. Rain. 1,816. Situated in a mesa between Río Chama and Río Albarregas. In the river valleys conditions

are tropical or subtropical but mountains rise abruptly on either side and temperate forests are accessible within a few hours travel (Osgood and Conover).

110. Monay, Edo. Trujillo — 9°24′02″N., 70°36′21″W — Elev. 340 m. — H. Rain., Aug. (162), L. Rain., Mar. (27), Ann. Rain. 970.

111. Motatán, Edo. Trujillo — 9°32′00″N., 70°24′00″W. — Elev. 296 m. — H. Rain., Oct. (206), L. Rain., Feb. (52), Ann. Rain. 1,504.

112. Minapana, Quebrada, Edo. Yaracuy — A stream near Palma Sola.

113. Mucujún, Río, Edo. Mérida — Río Chama System, with headwaters in Sierra La Culata and mouth above Mérida.

114. Negro, Río, Terr. Amaz. — River that connects the Amazon with the Orinoco through the Casiquiare Canal.

115. Nirgua, Edo. Yaracuy — 10°09′06″N., 68°34′13″W. — Elev. 798 m. — H. Rain., May (171), L. Rain., Feb. (1), Ann. Rain. 923. Conditions, similar to Bejuma but country is rougher and adjacent to the town more despoiled. Río Borria runs at the foot of the plateau on which the town is built. Above the intake of the city water supply, the river flows through brush and small trees. A few miles north of town there is a quebrada in pastures, brush, and coffee and banana plantings; on top of the hill, a humid forest (Williamson).

116. Ocumare de la Costa, Edo. Aragua — 10°27′30″N., 67°46′07″W. approx. — Elev. 15 m.

117. Ocumare del Tuy, Edo. Miranda — 10°07′03″N., 66°46′07″W. — Elev. 210 m. — H. Rain., Jul. (206), L. Rain., Feb. (15), Ann. Rain. 1,125.

118. Orope, Edo. Táchira — 8°22′30″N., 72°22′00″W. approx. — Elev. not more than 100 m. In the heart of the humid tropical forest where its conditions are developed to the highest degree (Osgood and Conover).

119. Oropito, Río, Edo. Zulia — River that passes near La Fría in the southern part of Lake Maracaibo.

120. Palenque, Edo. Guárico — 8°59′30″N., 66°58′00″W. approx. — Elev. between 100 and 200 m.

121. Palma Sola, Edo. Falcón — 10°36′35″N., 68°33′35″W. — Elev. 40 m. approx. — Ann. Rain., 1,703. In a nearly flat, heavily wooded country. The Aroa River, which passes by, is swift and shallow in this region.

122. Pariaguán, Edo. Anzoátegui — 8°06'00"N., 64°44'00"W. — Elev. 123 m. — H. Temp., Apr. (27.4°), L. Temp., Jan., Jun., Dec. (26.0°), Ann. Temp. (26.3°). H. Rain., Jul. (311), L. Rain., Feb. (0), Ann. Rain. 1,428.

123. Parmana, Edo. Guárico — 7°50'00"N., 65°50'00"W. approx. — Elev. 80 m. approx. Vegetation intermediate between that of gallery forests and llanos. During the rainy season, the surrounding area is flooded but Parmana remains above the waters (Roze).

124. Paso del Diablo, Terr. Amaz. — 2°16'30"N., 66°33'00"W. approx. — Elev. 100-200 m.

125. Paují, Edo. Falcón — 11°01'N., 68°38'W. approx. — Elev. 200-500 m.

126. Paulo, Edo. Bolívar — Elev. 1,216 m. An Arecuna village, some seven miles to the southwest of the cliffs of Roraima, stands at the tip of a ridge springing from the Cuquenán foothills. The Cuquenán River and another stream to the west, which unite a quarter of a mile to the south, flank the ridge. Excepting a few small portions, damaged but not wholly destroyed by a fire, the forest has been replaced by deep mat of bracken, with innumerable bare whitening tree trunks thrusting through. Pokeweed usually mixed with the all-pervading bracken, has grown in as a replacement plant very abundantly at altitudes of 4,000-6,000 ft. The steep country south and east of Paulo is mostly devoid of forest; only in sheltered ravines and re-entrants small pockets of forest exist, invariably much damaged by fire (Chapman).

127. Pescado, Caño, Terr. Amaz. — A stream between Esmeralda and Cerro Duida. The ground in this region is level, trees tall and straight and many palms are distributed through it (Tate).

128. Petare, Edo. Miranda — 10°28'40"N; 66°48'32"W. — Elev. 844 m. — Ann. Temp. 22.0° — H. Rain., May (145), L. Rain., Mar. (5), Ann. Rain. 784.

129. Pie del Avila, D. F. — See Avila.

130. Pie del Cerro, Edo. Aragua — 10°19'30"N., 67°18'50"W. approx. — Elev. 810-1,350 m.

131. Puerto Ayacucho, Terr. Amaz. — 5°53'40"N., 67°41'49"W. — Elev. 110 m. — H. Temp., Mar. (30.1°), L. Temp., Jul. (26.4°), Ann. Temp. 27.9° — H. Rain., Jun. (551), L. Rain., Feb. (3), Ann. Rain. 2,455. Conditions, mostly semi-arid, large extensions of savanna occur to the south and

east of the town but a strip of forest margins the Orinoco up to Sanariapo and high forest is also found on the left (east) of the road between Puerto Ayacucho and Sanariapo.

132. Puerto Cabello, Edo. Carabobo — 10°29′42″N., 68°00′31″W. — Elev. 5 m. — H. Temp., Oct. (27.3°), L. Temp., Feb. (25.2°), Ann. Temp. 26.2° — H. Rain., Jul. (10), L. Rain., Feb., Mar. (3), Ann. Rain. 82.

133. Puerto La Cruz, D. F. — 10°32′00″N., 67°21′00″W. approx. — Elev. 10 m. approx.

134. Rancho Grande, Edo. Aragua — 10°21′30″N., 67°41′00″W. — Elev. 1,130 m. — Ann. Temp. 18.9° approx. — H. Rain., Aug. (317), L. Rain., Jan. (19), Ann. Rain., 1,747.

135. Raudal de Dios, Terr. Amaz. — A rapid in the Cunucunuma River between La Culebra and Tapara. Elev. about 1,200 ft. Conditions, heavy tropical.

136. Riecito, Edo. Falcón — A few km. east of Cerro Cosme.

137. Roraima, Cerro, Edo. Bolívar — 5°12′00″N., 60°44′00″W. — Elev. 2,614 m. A flat-topped, quartzite cerro with vertical sides and a summit area of 25 sq. km. The Summit Camp of Tate and previous visitors was located in a shallow, rocky basin only a few hundred yards in extent, close to the summit of the ledge. See also Arabopó and Cuquenán.

138. Rosario, Edo. Zulia — 9°13′N., 72°39′W. approx. — Elev. not more than 100 m. A small village at the end of the extensive "ciénagas" of the Santa Ana-Catatumbo.

139. Sabana de Mendoza, Edo. Trujillo — 9°27′27″N., 70°46′11″W. — Elev. 118 m. — H. Rain., Oct. (150), L. Rain., Jan. (31), Ann. Rain. 1,122.

140. Sanariapo, Terr. Amaz. — 5°15′00″N., 67°49′00″W. — Elev. 150 m. approx. Conditions, semiarid. East of the village there is a small spring that is surrounded by a patch of humid forest.

141. San Antonio, Terr. Amaz. — 3°30′30″N., 66°44′30″W. approx. — Elev. between 100-200 m. An abandoned plantation at the northeastern margin of the Orinoco. Conditions, heavy tropical.

142. San Carlos, Terr. Amaz. — 1°55′50″N., 67°03′50″W. approx. — Elev. not more than 100 m.

143. San Cristóbal, Edo. Táchira — 7°46′11″N., 72°14′20″W. — Elev. 830 m. — H. Temp., Mar. (22.8°), L. Temp., Jan. (21.4°), Ann. Temp. (22°). H. Rain., Jun. (218), L. Rain., Feb. (22), Ann. Rain. 1,463.

144. San Esteban, Edo. Carabobo — 10°25′50″N., 68°01′00″W. approx. — Elev. between 100-200 m. A town on Río San Esteban. The river is a swift stream except below the town, where it flows for several miles through nearly level sand plain. Above San Esteban the entire valley is wooded with much coffee and cacao on the main stream and more native forest on the higher "quebradas"; below the town, the stream is largely in the sun (Williamson).

145. San Felipe, Edo. Yaracuy — 10°20′38″N., 68°44′04″W. — Elev. 255 m. H. Temp., Oct. (26.6°), L. Temp., Jan. (25.4°), Ann. Temp. 26.1° — H. Rain., May (209), L. Rain., Mar. (20), Ann. Rain. 1,496. In the alluvial plain of the Yaracuy River.

146. San Fernando de Apure, Edo. Apure — 7°53′40″N., 67°28′11″W. — Elev. 73 m. — H. Temp., Apr. (28.7°), L. Temp., Jun. (26.3°), Ann. Temp. 27.4° — H. Rain., (287), L. Rain., Jan. (1), Ann. Rain. 1,415.

147. San Fernando de Atabapo, Terr. Amaz. — 4°02′20″N., 60°42′30″W. approx. — Elev. between 100-200 m. San Fernando marks the place where the savanna and semiarid country ends and the dense jungle begins. Collections come mostly from the savannas surrounding the town and from a fairly extensive forest patch at the edge of the Atabapo River.

148. San Juan de los Morros, Edo. Guárico — 9°53′00″N., 67°20′42″W. — Elev. 430 m. H. Temp., Apr. (25.9°), L. Temp., Jan. (23.2°), Ann. Temp. 24.5° — H. Rain., Jul. (301), L. Rain., Feb. (5), Ann. Rain. 1,342.

149. San Juan, Río, Edo. Zulia — Tributary of Río Motatán, in the southeastern part of Lake Maracaibo.

150. San Julián, D. F. — 10°36′N., 66°51′W. approx. — Elev. near sea level. The hamlet, consisting of a few scattered huts, is located in an irrigated valley above the village of Caraballeda. The mountains behind San Julián are well forested (Robinson and Lyon).

151. Santa Ana, Río, Edo. Zulia — Large river on the western side of Lake Maracaibo.

152. Santa Catalina — Apart from the fact that it is in Río Orinoco, I have been unable to obtain any other information about this locality.

153. Santa Elena, Edo. Bolívar — 4°36′05″N., 61°06′52″W. — Elev. 907 m. — H. Temp., Mar. (22.4°), L. Temp., Jul. (21.1°), Ann. Temp. 21.8° — H. Rain., Jun. (251), L.

Rain., Feb. (62), Ann. Rain. 1,628. In the Gran Sabana, in the angle formed in the southeast by Venezuela, British Guiana and Brasil.

154. Santa Elena, Edo. Mérida — 8°50′30″N., 71°35′30″W. approx. — Elev. not more than 100 m. In the alluvial plain characterized by heavy, humid tropical forest (Osgood and Conover).

155. Santa Lucía, Edo. Miranda — 10°18′N., 66°39′W. approx. — Collections come from elevations between 300 and 810 m.

156. Sierra Maestra, Edo. Aragua — I have been unable to obtain any information about this locality.

157. Sosa, Edo. Guárico — Elev. 200 m. approx. On Río Guárico. Frogs collected in the grass at the margin of the river. Gallery forest follows the course of Río Guárico but the rest of the country is savanna covered (Roze).

158. Táchira, Edo. Táchira — 8°07′N., 72°20′ W.approx. — Elev. about 365 m. Heavily wooded region of steep or precipitous mountain sides and many streams (Williamson).

159. Tanaguarena, D. F. — In the vicinity of La Guaira and Macuto. Elev. 10 m. Conditions, arid to semiarid (Roze).

160. Tapara, Terr. Amaz. — The last navigable (canoe) point of Río Cunucunuma. Conditions, humid tropical except at the edge of the river where the trees are sparse and small.

161. Temiche, Terr. Amaz. — A camp on the southern slopes of Cerro Marahuaca, at an elevation of 4,050 ft. Conditions, humid tropical or lower subtropical. A great abundance of an enormously leaved palm and tall trees that make the place very umbrageous. A stream at about 50 ft. from camp.

162. Trujillo, Edo. Trujillo — 9°22′24″N., 70°26′08″W. — Elev. 790 m. — H. Rain., Nov. (137), L. Rain., Jan. (41), Ann. Rain. 936.

163. Tucacas, Edo. Falcón — 10°15′30″N., 68°19′08″W. — Elev. 4 m. H. Rain., Nov. (212), L. Rain., Feb. (37), Ann. Rain. 1,053. Dry woods and dry Heliconia patches adjacent to the town; back of it, a small boggy stream.

164. Tunapucito, Edo. Sucre — 10°36′00″N., 63°09′30″W. approx. — Elev. about 300 m.

165. Turgua, Edo. Miranda — At about 20 km. from Caracas, between Petare and Baruta. Elev. 1,100 m. approx. Conditions, subtropical (Roze).

166. Turumiquire, Cerro, Edos. Sucre-Monagas — 10°7'N., 63°52'W. approx. Elev. 2,630 m. A mountain on the eastern part of the Coastal Range.
167. Unare, Edo. Anzoátegui — 10°05'30"N., 65°11'00"W. — Elev. sea level approx.
168. Upata, Edo. Bolívar — 8°01'07"N., 62°24'33"W. — Elev. 340 m. H. Rain., May (138), L. Rain., Feb. (0), Ann. Rain. 868.
169. Uribante, Río, Edos. Táchira and Barinas — Tributary of Río Apure, with headwaters in the Andes of Táchira and mouth at 7°18'N., 70°46'W. approx.
170. Valencia, Edo. Carabobo — 10°11'10"N., 67°59'58"W. — Elev. 478 m. — H. Temp., Oct. (24.9°), L. Temp., Jan. (24.0°), Ann. Temp. (24.6°). H. Rain., Aug. (187), L. Rain., Mar. (3), Ann. Rain. 1,120.
171. Villa del Rosario, Edo. Zulia — 10°19'54"N., 72°19'30"W. — Elev. 80 m. approx.
172. Wanadi, Caño, Terr. Amaz. — A swift running stream on the slopes of Mt. Marahuaca. Collections from the stream or from the surrounding heavy jungle at an elevation of 1,225 m.
173. Waika-piapu Mt. (Ualacatipu), Edo. Bolívar — A mountain on the west north-west of Roraima and Cuquenán. Together with the Urutipú and Charantipú it forms a ridge that cuts off the Mazaruni and Cuyuní Rivers.
174. Yapacana, Cerro, Terr. Amaz. — 3°42'N., 62°45'W. approx. — Elev. 1,250 m.
175. Yumarito, Río, Edo. Yaracuy — A stream in Boquerón.
176. Zaraza, Edo. Guárico — 9°20'09"N., 65°19'03"W. — Elev. 60 m. — H. Rain., Jul. (241), L. Rain., Feb. (6), Ann. Rain. 1,144.

REFERENCES CITED

Ahl, Ernst

1939. Über die richtige Bennenung des als "*Hyla boans*" bezeichneten südamerikanischen Laubfrosches. Zool. Anz., **127**: 318-319.

Alemán, G. C.

1952. Apuntes sobre Reptiles y Anfibios de la Región Baruta-El Hatillo. Mem. Soc. Cienc. Nat. LaSalle, **12**: 11-30, 32 figs.

1953. Contribución al Estudio de los Reptiles y Batracios de la Sierra Perijá. Mem. Soc. Cienc. LaSalle, **13**: 499-531, figs. 1-16.

Andersson, Lars Gabriel

1900. Catalogue of Linnean Type Specimens of Linneaus's Reptilia in the Royal Museum in Stockholm. Bih. till K. Svenska Ved-Akad., **26** (1): 1-29.

1906. On Batrachians from Bolivia, Argentina and Perú collected by Erland Nordenskiöld and Nils Holmgren. Arkiv. för Zoologi., **3** (12): 1-19, pl. I, figs. 1-4b.

1945. Batrachians from East Ecuador collected 1937, 1938 by Wm. Clarke-Macintyre and Rolf Blomberg. Arkiv. för Zoologi., **37** (2): 1-88, figs. 1-26.

Baker, Horace Burrington

1923. The Mollusca Collected by the University of Michigan-Williamson Expedition in Venezuela. Occ. Pap. Mus. Zool. Univ. Mich., No. 137: 1-45, pls. I-VI.

Barbour, Thomas

1923. A New *Pipa*. Proc. New Eng. Zool. Club, **9**: 3-5, pls. I-II.

Baumann, Franz

1912. Brasilianische Batrachier des berner naturhistorischen Museums. Zool. Jahrb., Abteilung für Systematik, Geographie und Biologie der Tiere: **33**: 87-172, pls. IV-VI.

Beebe, William and Jocelyn Crane

1948. Ecología de Rancho Grande, Una Selva Nublada Subtropical en el Norte de Venezuela. Bol. Soc. Ven. Cienc. Nat., **11** (73): 217-258, figs. 1-10, pls. I-V.

Berg, Carlos

1896-7. Batracios Argentinos. Ann. Mus. Nac. Buenos Aires (2) **5**: 147-226.

Boddaert, Pieter

1772. Epistola ad Virum Celeberrimum Johannem Costerdyk Schacht . . . De *Rana bicolore*, Museum Schlosseriarum (Amstelodami): 1-48, 6 pls.

Boettger, Oskar

1892. Katalog der Batrachier-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft, Frankfurt a.M. Pp. i-x + 1-73.

1893a. Ein neuer Laubfrosch aus Costa Rica. Ber. Senckenb. Naturf. Ges. 1892-3: 251-252 (1893).

1893b. Reptilien und Batrachier aus Venezuela. Ber. Senckenb. Naturf. Ges., 1893: 35-42.

1893c. Ein neuer Beutelfrosch. Zool. Gart., **34** (5): 129-132.

1894. Description of two New Species. *In*: Mole, R. R. and Urich, F. W., A Preliminary List of the Reptiles and Batrachians of the Island of Trinidad. Journ. Field Nat. Club (Trinidad), **2** (1): 77-90.

1895-6. Geschenke und Erwerbungen, Juni 1895 bis Juni 1896, Reptilien und Batrachiersammlung. Ber. Senckenb. Naturf. Ges., 1896: LIV-LV.

Bokerman, Werner C. A.

1950. Redescrição e novo nome genérico para *Coelonotus fissilis* Mir-Rib., 1920. Papeis Avulsos Dept. Zool., Sec. Agr., Sao Paulo, **9**

(14): 215-222, figs. 1-8.

BOULENGER, GEORGE ALBERT

1882. Catalogue of the Batrachia Salientia in the Collection of the British Museum, ed. 2, London. Pp. i-xvi + 1-503, pls. I-XXX.

1883. On a Collection of Frogs from Yurimaguas, Huallaga River, Northern Perú. Proc. Zool. Soc. London: 635-638, pls. LVII-LVIII.

1889. On a Collection of Batrachians made by Prof. Charles Spegazzini at Colonia Resistencia, South Chaco, Argentine Republic. Ann. Mus. Civ. Stor. Nat. Genova, (2) **7**: 246-249.

1890. Second Report on Additions to the Batrachian Collection in the Natural History Museum. Proc. Zool. Soc. London: 323-328, pls. XXV-XXVI.

1891. Notes on American Batrachians. Ann. Mag. Nat. Hist., (6) **8**: 453-457.

1895. Description of a new Batrachian (*Oreophryne Quelchii*) discovered by Messrs. J. J. Quelch and F. McConnel on the summit of Mt. Roraima. Ann. Mag. Nat. Hist., (6) **15**: 521-522.

1895. Miscellaneous. Correction to p. 521 (''Annals,'' June 1895). Ann. Mag. Nat. Hist., (6) **16**: 125.

1898. A List of the Reptiles and Batrachians Collected by the late Prof. L. Balzan in Bolivia. Ann. Mus. Civ. Stor. Nat. Genova, (2) **19**: 128-133.

1900. Report on a Collection made by Messrs. F. V. McConnel and J. J. Quelch at Mt. Roraima in British Guiana. Trans. Linn. Soc. London, (2) **8**: 51-76, pls. IV-VI.

1903. On Some Batrachians and Reptiles from Venezuela. Ann. Mag. Nat. Hist., (7) **11**: 481-484.

1903. Descriptions of New Batrachians in the British Museum. Ann. Mag. Nat. Hist., (7) **12**: 552-557.

1905. Descriptions of new Tailless Batrachians in the Collection of the British Museum. Ann. Mag. Nat. Hist., (7) **16**: 180-184.

1912. Descriptions of new Batrachians from the Andes of South America, preserved in the British Museum. Ann. Mag. Nat. Hist., (8) **10**: 185-191.

1918. Descriptions of new South American Batrachians. Ann. Mag. Nat. Hist., (9) **2**: 427-433.

1920. A Monograph of the American Frogs of the Genus *Rana*. Proc. Amer. Acad. Arts Sci., **55** (9): 413-480.

BROCCHI, PAUL

1882. Étude des Batraciens de l'Amerique Centrale. Paris. Pp. 1-123, pls. I-XXI.

BRONGERSMA, LEO DANIEL

1948. Frogs from the Leeward group, Venezuela and Eastern Colombia. *In*: Hummelinck, P. W., Studies on the Fauna of Curaçao, Aruba, Bonaire and the Venezuelan Islands. The Hague, **3**: 89-95, figs. (Not consulted.)

Burkhill, I. H.

1901. Introduction. *In*: Brown, N. E. and others, Report on two Botanical Collections made by Messrs. F. V. McConnel and J. J. Quelch at Mt. Roraima in British Guiana. Trans. Linn. Soc. London, (2) **6**: 1-107, pls. I-XIV.

Carvalho, Antenor L. de

1939. Notas sobre *Hemipipa carvalhoi* Mir.-Rib. (Batrachia Anura: Pipidae). la parte. Bol. Biol., **4** (3): 394-414, figs., pls. I-IV.

1941. Notas sobre os Géneros *Corythomantis* Boulenger e *Aparasphenodon* Mir.-Rib. Papéis Avulsos Dept. Zool. Sec. Agric. Sao Paulo., **1**: 101-110, figs. 1-3, map.

Cei, J. M.

1956. Nueva lista sistemática de los Batracios de Argentina y breves notas sobre su biología y ecología. Inv. Zool. Chilenas., **3**: 35-68, pls. I-IX, figs. 1-80.

Chapman, Frank M.

1924. Criteria for the Determination of Subspecies in Systematic Ornithology. The Auk, **41** (1): 17-29.

1925. Remarks on the Life Zones of Northeastern Venezuela with Descriptions of New Species of Birds. Amer. Mus. Novit., no. 191: 1-15.

1931. The Upper Zonal Bird-Life of Mts. Roraima and Duida. Bull. Amer. Mus. Nat. Hist., **63**: 1-135, figs. 1-42.

Chardón, Carlos E.

1933. Life Zones in the Andes of Venezuela. Bull. Pan. Amer. Union, **67**: 620-633.

1934. Mycological Explorations of Venezuela. Monogr. Univ. of P. R., Ser. B (2): 1-353. pls. I-XXXIII.

1938. Apuntaciones Sobre la Vida on los Andes. Bol. Soc. Ven. Cienc. Nat., **5** (35): 1-47, 3 pls.

Cochran, Doris M.

1955. Frogs of Southeastern Brazil. Bull. U. S. Nat. Mus., **206**: pp. i-xvi + 1-423, figs. 1-28, pls. 1-34.

Cope, Edward D.

1862a. On Some New and Little Known American Anura. Proc. Acad. Nat. Sci., Philadelphia: 151-159.

1862b. Catalogues of the Reptiles obtained during the Explorations of the Paraná, Paraguay, Vermejo and Uruguay Rivers, by Capt. Thos. J. Page, U.S.N., and of those procured by Lieut. N. Michler, U.S. top Eng., Commander of the Expedition conducting the Survey of the Atrato River. Proc. Acad. Nat. Sci. Philadelphia: 346-359.

1863. On *Trachycephalus, Scaphiopus* and other American Batrachia. Proc. Acad. Nat. Sci. Philadelphia: 43-99.

1865a. Third Contribution to the Herpetology of Tropical America. Proc. Acad. Nat. Sci. Philadelphia: 185-198.

1865b. Sketch of the Primary Groups of Batrachia Salientia. Nat. Hist. Review: 97-120.

1866. Fourth Contribution to the Herpetology of Tropical America. Proc. Acad. Nat. Sci. Philadelphia: 123-132.

1867. On the Families of Raniform Anura. Journ. Acad. Nat. Sci. Philadelphia, (2) **2**: 189-206.

1868a. An Examination of the Reptilia and Batrachia obtained by the Orton Expedition to Ecuador and the Upper Amazon, with notes on other species. Proc. Acad. Nat. Sci. Philadelphia: 96-140.

1868b. Sixth Contribution to the Herpetology of Tropical America. Proc. Acad. Nat. Sci. Philadelphia: 305-313.

1871. Eighth Contribution to the Herpetology of Tropical America. Proc. Amer. Philos. Soc., **11**: 553-559.

1874. On Some Batrachia and Nematognathi Brought from the Upper Amazon by Prof. Orton. Proc. Acad. Nat. Sci. Philadelphia: 120-137.

1887a. Synopsis of the Batrachia and Reptilia obtained by H. H. Smith, in the Province of Matto Grosso, Brazil. Proc. Amer. Philos. Soc., **24** (125): 44-60.

1887b. Catalogue of the Batrachians and Reptiles of Central America and Mexico. Bull. U. S. Nat. Mus., **32**: 1-98.

1889. The Batrachia of North America. Bull. U. S. Nat. Mus., **34**, 515 pp., pls. I-LXXXIII, LXXXVI.

1899. Contributions to the Herpetology of New Grenada and Argentina. Scient. Bull. Phila. Mus., (1): 1-22, pls. I-IV.

Crawford, Stanton C.

1931. Field Keys to the Lizards and Amphibians of British Guiana. Ann. Carnegie Mus., **21** (1): 11-42.

Daudin, François Marie

1803a. Histoire naturelle des Rainettes, des Grenouilles et des Crapauds. Paris, An. XI. Pp. 1-71, pls. I-XXXVIII.

1803b. Histoire naturelle generale et particuliere des reptiles. Paris, **8**: 1-439, pls. xciii-c.

Duellman, William E.

1956. The Frogs of the Hylid Genus *Phrynohyas* Fitzinger, 1843. Misc. Publ. Mus. Zool. Univ. Mich., No. 96: 1-47, figs. 1-10, maps 1-4, pls. I-VI.

Duméril, André M. C. and Gabriel Bibron

1841. Erpétologie Générale, **8**, (Paris): Pp. i-ii + 1-792.

Dunn, Emmet Reid

1931. New Frogs from Panamá and Costa Rica. Occ. Pap. Boston Soc. Nat. Hist., **5**: 385-401.

1933. A New *Hyla* from the Panama Canal Zone. Occ. Pap. Boston Soc. Nat. Hist., **8**: 61-64.

1940. New and Noteworthy Herpetological Material from Panamá. Proc. Acad. Nat. Sci. Philadelphia, **92**: 102-122, pl. II.

1944a. Los Géneros de Anfibios y Reptiles de Colombia, Primera parte: Anfibios. Caldasia, **2** (10): 497-529.

1944b. Herpetology of the Bogotá Area. Rev. Acad. Cienc. Colombia, **6** (21): 68-81.

1948. American Frogs of the Family Pipidae. Amer. Mus. Novit., no. 1384: 1-13, figs. 1-2.

1949. Notes on South American Frogs of the Family Microhylidae. Amer. Mus. Novit., no. 1419: 1-21, figs. 1-7.

DUNN, E. R. AND L. C. STUART

1951. On the Legality of Restriction of Type Locality. Science, **113**: 677-678.

ERNST, ADOLFO

1877. Estudios Sobre la Flora y Fauna de Venezuela. Caracas. Pp. 211-330.

FOWLER, HENRY W.

1913. Amphibians and Reptiles from Ecuador, Venezuela and Yucatán. Proc. Acad. Nat. Sci. Philadelphia, **65**: 153-176, pls. V-X.

FUNKHOUSER, ANNE

1957. A Review of the Neotropical Tree-Frogs of the Genus *Phyllomedusa*. Occ. Pap. Mus. Nat. Hist. Stanford Univ., no. 5: 1-89, figs. 1-40.

GAIGE, HELEN THOMPSON

1922. A New *Gastrotheca* from Venezuela. Occ. Pap. Mus. Zool. Univ. Mich., no. 107: 1-3.

GARMAN, SAMUEL

1887. On West Indian Reptiles and Batrachians in the Museum of Comparative Zoology. Bull. Essex Inst., **19**: 1-24.

GIRARD, CHARLES

1853. Descriptions of New Species of Reptiles Collected by the U. S. Exploring Expedition under the Command of Capt. Charles Wilkes, U. S. N. Proc. Acad. Nat. Sci. Philadelphia, **6**: 420-425.

GLEASON, H. A. AND COLLABORATORS

1931. Botanical Results of the Tyler-Duida Expedition. Bull. Torrey Bot. Club, **58**: 277-506, pls. XVII-XLV.

GOIN, COLEMAN J.

1957. Status of the Frog Genus *Sphoenohyla* with a Synopsis of the Species. Caldasia, no. 36: 11-31, figs. 1-2.

GONZÁLEZ, P. EPIFANIO

1948. Datos Detallados de Climatología de Venezuela. Publicaciones de la División de Malariología, Ministerio de Sanidad y Asistencia Social, (Caracas, Venezuela), no. 8: 1-639.

GÜNTHER, ALBERT

1858. Catalogue of the Batrachia Salientia of the British Museum. London. Pp. i-xvi + 1-160, pls. I-XII.

1868. First Account of Species of Tailless Batrachians Added to the Collection of the British Museum. Proc. Zool. Soc. London: 478-490, pls. XXXVII, XXXIX, XL.

1885-1902. Biologia Centrali-Americana, Reptilia and Batrachia, London. Pp. i-xx + 1-326, pls. I-LXXVI.

HELLMICH, WALTER

1940. Contribución al Conocimiento de la Fauna Venezolana. Bol. Soc. Ven. Cienc. Nat., **6**: 46: 318-327.

1940. Beitrag zur Kenntnis der individuellen und geographischen Variabilität von *Hyla vilsoniana* Cope. Zool. Anz., **129** (1/2): 1-12, figs. 1-2.

1940. Beiträge zur Kenntnis der Gattung *Hyloxalus* (Brachycephalidae, Amphib.). Zool. Anz., **131** (5/6): 113-128.

HITCHCOCK, CHARLES B.

1947. The Orinoco-Ventuari Region, Venezuela. Geog. Rev., **37**: 525-566, 43 photos, 2 text maps, 1 insert map.

JIMÉNEZ DE LA ESPADA, MARCOS

1870. Fauna neotropicales species quaedan nondum cognites; Amphibia. Jorn. Sci. Acad. Lisbon, **3**: 58-65.

1875. Vertebrados del Viaje al Pacífico; Batracios. Madrid. Pp. 1-208, pls. I-III, 3 bis.-6.

KEFERSTEIN, WILHELM MORITZ

1867. Über einige neue oder seltene Batrachier aus Australien und dem tropischen Amerika. Nachr. Ges. Wissensch. Gotting., no. 18: 342-361.

LAURENTI, J. N.

1768. Austriaci Viennensis Specimen Medicum, exhibiens Synopsis Reptilium Emendatam cum experimentalis circa venena et Antidota Reptilium Austriacacorum. Vienna. Pp. 1-216.

LEAVITT, BENJAMIN B.

1933. On Three Races of *Bufo typhonius*. Copeia, no. 1: 7-8.

LICHTENSTEIN, M. H. C. AND E. VON MARTENS

1856. Nomenclator Reptilium et Amphibiorum Musei Zoologici Berolinensis. Gedruckt Akad. Wissensch. Berlin. Pp. i-iv + 1-48.

LIDDLE, RALPH ALEXANDER

1946. The Geology of Venezuela and Trinidad, ed. 2, New York. Pp. i-xlvii + 1-890, pls. I-LXXIX.

LINNÉ, KARL VON

1758. Systema Naturae. Holmiae, ed. 10 reformata, **1**: 1-532.

LIU, CHENG-CHAO

1935. Types of Vocal Sacs in the Salientia. Proc. Boston Soc. Nat. Hist., **41** (3): 19-40, figs. 1-8, pls. 4-8.

LOPEZ, V. M., JOHN C. DAVEY AND E. RUBIO

1946. Informe preliminar de la Region sur del Departamento Antonio Díaz, Territorio Federal Delta Amacuro. Rev. de Fomento, Ministerio de Fomento, **64**: 61-125, 34 pls., maps.

LUTZ, ADOLPHO

1926. Observacões sobre Batrachios brasileros, Parte 1: O genero *Leptodactylus* Fitzinger. Mem. Inst. Osw. Cruz, **19**, fasc. II: 139-154, pls. XXX-XXXVII.

1927. Notas sobre batrachios de Venezuela e da Ilha de Trinidad. Mem. Inst. Osw. Cruz, **20**, fasc. I: 35-50, pls. VIII-XV.

LUTZ, ADOLPHO AND BERTHA LUTZ

1938. On *Hyla aurantiaca* Daudin and *Sphoenorhynchus* Tschudi and on two allied Hylae from South-Eastern Brazil. Ann. Acad. Bras. Sci., **10** (2): 176-185, figs. 1-7a.

LUTZ, BERTHA AND GERTRUDE R. KLOSS

1952. Anfibios Anuros do Alto Solimoes e Rio Negro. Apontamentos sobre algunas formas e suas vicariantes. Mem. Inst. Osw. Cruz, **50**: 624-678, 2 maps.

MEEK, SETH EUGENE

1910. Notes on Batrachians and Reptiles from the Islands North of Venezuela. Zool. Ser. Field Mus. Nat. Hist., **6** (12): 415-418.

MELIN, DOUGLAS

1941. Contribution to the Knowledge of Amphibia of South America. Goteborgs Kungl. Vetensk.-och Vitterh.-Sam. Handl., Ser. B, **1** (4): 1-71, figs. 1-38.

MERTENS, ROBERT

1926. Herpetologische Mitteilungen VIII-XV. Senckenbergiana, **8** (3/4): 137-155.

1940. Nochmals über den Namen *Hyla boans*. Zool. Anz., **132**, (7/8): 195.

1950. Ein neuer Laubfrosch aus Venezuela. Senckenbergiana, **31** (1/2): 1-2.

MIRANDA, RIBEIRO, ALIPIO DE

1920. *Triprion, Diaglena, Corythomantis* etc., uma sub-secção de Hylidae, com duas especies novas. Rev. Mus. Paulista, **12**: 85-89, 2 pls.

1926. Notas para servirem ao Estudo dos Gymnobatrachios (Anura) Brasileiros. Archiv. Mus. Nac. Río de Janeiro, **27**: 1-227, figs. 1-110, pls. I-XXII.

MYERS, GEORGE S.

1942. Notes on some Frogs from Perú and Ecuador. Proc. Biol. Soc. Washington, **55**: 151-156.

MYERS, GEORGE S. AND JOHN W. FUNKHOUSER

1951. A New Giant Toad from Southwestern Colombia. Zoologica (N.Y.), **36**: 279-281.

MÜLLER, LORENZ

1923. Neue oder seltene Reptilien und Batrachier der Zoologischen Sammlung des bayr. Staates, Zool. Anz., **57** (½): 38-42.

1927. Amphibien und Reptilien der Ausbeute Prof. Bresslau's in Brasilien 1913-14. Abh. Senckenb. Naturf. Ges., **40** (3): 259-304.

1934. Über eine neue Rasse von *Atelopus cruciger* (Licht. u. Marts.) von Venezuela. Zool. Anz., **108** (7/8): 145-155.

1938. Batrachologische Mitteilungen. Zool. Anz., **121** (9/10): 284-288.

MÜLLER, LORENZ AND WALTER HELLMICH

1936. Wissenschaftliche Ergebnisse der deutschen Gran Chaco-Expedition; Amphibien und Reptilien. Stuttgart. Pp. i-x + 1-120, figs. 1-36, pls. I-VIII.

NETTING, M. GRAHAM

1930a. A new Toad of the Genus *Eupemphix*. Ann. Carnegie Mus., **19** (3): 167-168, pl. VII, figs. 1-2.

1930b. The Systematic Status and Breeding Habits of *Eupemphix trinitatis* Boulenger. Ann. Carnegie Mus., **19** (4): 249-254.

NIEDEN, FRITZ

1923. Anura I. Das Tierreich, **46**: i-xxxii + 1-584 pp., figs. 1-380. Leipzig.

1926. Anura II. Das Tierreich, **49**: i-xvi + 1-110 pp., figs. 1-55. Leipzig.

NOBLE, G. K.

1917. The Systematic Status of Some Batrachians from South America. Bull. Amer. Mus. Nat. Hist., **37**: 793-814, pls. XCIII-XCVI.

1918. The Amphibians Collected by the American Museum Expedition to Nicaragua in 1916. Bull. Amer. Mus. Nat. Hist., **38**: 311-347, pls. XIV-XIX.

1920. The New Batrachians from Colombia. Bull. Amer. Mus. Nat. Hist., **42**: 441-446.

1923. New Batrachians from the Tropical Research Station, British Guiana. Zoologica (N.Y.), **3** (14): 289-305, 3 text maps.

1925. A new Genus of Surinam Toads (Pipidae). Amer. Mus. Novit., No. 164: 1-3.

1931. The Biology of the Amphibia. New York. Pp. i-xiii + 1-577, figs. 1-174.

OSGOOD, WILFRED H. AND BOARDMAN CONOVER

1922. Game Birds from Northwestern Venezuela. Zool. Ser. Field. Mus. Nat. Hist., **12** (3): 19-47.

PARKER, H. W.

1927. A Revision of the Frogs of the Genera *Pseudopaludicola*, *Physalaemus* and *Pleurodema*. Ann. Mag. Nat. Hist., (9) **20**: 450-478, figs. 1-5.

1928. Notes on Reptiles and Batrachians from Matto Grosso and E. Bolivia. Ann. Mag. Nat. Hist., (10) **2**: 96-99.

1932. The Systematic Status of Some Frogs in the Vienna Museum. Ann. Mag. Nat. Hist., (10) **10**: 341-343.

1933. A List of the Frogs and Toads from Trinidad. Trop. Agr. (Trinidad), **10** (1): 8-12.

1934. A Monograph of the Frogs of the Family Microhylidae. London. Pp. i-viii + 1-208, figs. 1-67.

1935. The Frogs, Lizards and Snakes of British Guiana. Proc. Zool. Soc. London, 1935: 505-530.

1936. A Collection of Reptiles and Amphibians from the Upper Orinoco. Bull. Mus. Roy. Hist. Nat. Belgique, **12** (26): 1-4.

1938. The Vertical Distribution of Some Reptiles and Amphibians in Southern Ecuador. Ann. Mag. Nat. Hist., (11) **2**: 438-450.

1940. Undescribed Anatomical Structures and New Species of Reptiles and Amphibians. Ann. Mag. Nat. Hist., (11) **5**: 257-274.

PERACCA, MARIO GIACINTO

1904a. Viaggio del Dr. A. Borelli nel Matto Grosso brasiliano e nel Paraguay, 1899; Rettili ed Amfibii. Boll. Mus. Zool, Anat. Torino, **19** (460): 1-14.

1904b. Viaggio del Dr. Enrico Festa nell' Ecuador e regioni vicine: Rettili ed Amfibii. Boll. Mus. Zool. Anat. Torino, **19** (465): 1-41.

1914. Reptiles et Batrachiens de Colombie. Mem. Soc. Sci. Neuchatel, **5**: 96-111.

PETERS, WILHELM

1859. Hr. Peters legte eine neue Gattung und eine neue Art von Fröschen aus Caracas vor. Monatsb. Akad. Wissensch. Berlin: 402-403.

1863. Hr. W. Peters machte eine Mittheilung über eine neue Schlangengattung, *Styporhynchus,* und verschiedene andere Amphibien des zoologischen Museums. Monatsb. Akad. Wissensch. Berlin: 399-413.

1868. Hr. W. Peters machte fernere Mittheilungen über neue Batrachier. Monatsb. Akad. Wissensch. Berlin: 445-470.

1872. Hr. W. Peters machte eine Mittheilung über eine Sammlung von Batrachiern aus Neu-Freiburg in Brasilien. Monatsb. Akad. Wissensch. Berlin: 680-684.

1877. Sammlung des Hr. Dr. Carl Sachs in Venezuela. Monatsb. Akad. Wissensch. Berlin: 457-460.

PHELPS, WILLIAM

1938a. La Expedición del American Museum of Natural History al Monte Auyantepui. Bol. Soc. Ven. Cienc. Nat., **4** (32): 251-265.

1938b. La Procedencia Geográfica de las Aves Coleccionadas en el Cerro Roraima. Bol. Soc. Ven. Cienc. Nat., **5** (36): 57-70, maps A-F.

1943. Las Aves de Perijá. Bol. Soc. Ven. Cienc. Nat., **8** (56): 265-338, 2 pls., 2 maps.

PHELPS, WILLIAM AND WILLIAM H. PHELPS JR.

1948. Lista de las Aves de Venezuela con su Distribución, Parte 2, Passeriformes. Bol. Soc. Ven. Cienc. Nat., **12** (75): 1-427.

PIATT, JEAN

1934. The Systematic Status of *Eleutherodactylus latrans* (Cope). Amer. Midland Nat., **15** (1): 89-91.

PROCTER, JOAN B.

1921. On a Small Collection of Reptiles and Batrachians made by Mr. Goodfellow in E. Bolivia (1918-19). Ann. Mag. Nat. Hist., (9) **7**: 189-192.

REINHARDT, J. AND C. LÜTKEN

1861. Bidrag til Kundskab om Brasiliens Padder og Krybdyr. Vidensk. Medd. Nat. Forening, no. 1: 143-203, pls. I-IV.

ROBINSON, WIRT AND MARCUS WARD LYON JR.

1902. An Annotated List of Mammals Collected in the Vicinity of La Guaira, Venezuela. Proc. U. S. Nat. Mus., **24**: 135-162.

RÖHL, EDUARDO

1949. Fauna Descriptiva de Venezuela, Vertebrados, ed. 2(Caracas). Pp. 1-495, figs. 1-246. (1st ed. 1942.)

ROUX, JEAN

1927. Contribution à l'erpétologie du Vénézuéla. Verh. Naturf. Ges. Basel, **38**: 252-261.

RUTHVEN, ALEXANDER

1914. Description of a new Engystomatid Frog of the Genus *Hypopachus*. Proc. Biol. Soc. Washington, **27**: 77-80.

1916. Description of a new Species of *Atelopus* from the Santa Marta Mountains, Colombia. Occ. Pap. Mus. Zool. Univ. Michigan, no. 28: 1-3, pl. I.

1916. A new Species of *Paludicola* from Colombia. Occ. Pap. Mus. Zool. Univ. Michigan, no. 30: 1-3.

1917. Two new Species of *Eleutherodactylus* from Colombia. Occ. Pap. Mus. Zool. Univ. Michigan, no. 39: 1-6, pl. I.

1919. The Amphibians of the University of Michigan-Walker Expedition to British Guiana. Occ. Pap. Mus. Zool. Univ. Michigan, no. 69: 7-14, pls. I-III.

1922 The Amphibians and Reptiles of the Sierra Nevada de Santa Marta, Colombia. Misc. Publ. Mus. Zool. Univ. Michigan, no. 8: 1-70, pls. I-XII, 1 map.

RUTHVEN, ALEXANDER AND HELEN T. GAIGE

1923. Description of a new Species of *Pipa* from Venezuela. Occ. Pap. Mus. Zool. Univ. Michigan, no. 136: 1-2.

SAVAGE, JAY M. AND ANTENOR L. DE CARVALHO

1953. The Family Position of Neotropical Frogs Currently Referred to the Genus *Pseudis*. Zoologica (N.Y.), **38** (4): 193-200.

SEBA, ALBERTUS

1735. Locupletissimi Rerum Naturalium Thesauri Accurata Descriptio, et Iconibus Artificiosessimis Expressio, per Universam Physices Historiam etc. (Amstelaedami), **1**, 1-178, pls. I-CXI.

SCHMIDT, KARL P.

1932. Reptiles and Amphibians of the Mandel Venezuelan Expedition. Zool. Ser. Field Mus. Nat. Hist., **18** (7): 157-163.

SCHNEIDER, JOHANN GOTTLOB

1799. Historiae Amphibiorum Naturalis et Literarie. Jena, **1**: 1-264, pls. I-II.

SHREVE, BENJAMIN

1935. A New Teiid and Amphibia from Panama, Ecuador and Paraguay. Occ. Papers Boston Soc. Nat. Hist., **8**: 209-218.

1947. On Venezuelan Reptiles and Amphibians Collected by Dr. H. G. Kugler. Bull. Mus. Comp. Zool., **99** (5): 517-537.

SPIX, JOHANN BAPTIST VON

1824. Animalia Nova sive Species novae Testudinum et Ranarum quas in itinere per Brasilian Annis 1817-20 . . . collegit et descripsit . . . (Monachii, f°): 1-55, pls. I-XXII.

STEINDACHNER, FRANZ

1862. Über zwei noch unbeschriebene Batrachier aus den Sammlungen des k. k. Zoologischen Museum zu Wien. Archiv. per la Zoologia, **2**: 77-82, pl. VII.

1864. Batrachologische Mittheilungen. Verh. zool.-bot. Ges. Wien.: 239-288, pls. IX-XVII.

1867. Reise der osterreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859: Amphibien. (Wien), **1**: 1-70, pls. I-V.

STEJNEGER, LEONHARD

1902. An Annotated List of Batrachians and Reptiles Collected in the Vicinity of La Guaira, Venezuela, with Descriptions of Two New Species of Snakes. Proc. U. S. Nat. Mus., **24**: 179-192.

STEJNEGER, LEONHARD AND FREDERIK C. TEST

1891. Description of a New Genus and Species of Tailless Batrachian from Tropical America. Proc. U. S. Nat. Mus., **24**: 179-192.

TATE, G. H.

1930. Notes on Mount Roraima Region. Geogr. Rev., **20**: 31-52, 9 photos, 1 text map, 1 insert map.

1939. Auyantepui. Notas Sobre la Expedición Phelps (Phelps Venezuelan Expedition). Bol. Soc. Cienc. Nat., **5** (36): 96-125, figs. 1-17, 1 insert map.

1939. The Mammals of the Guiana Region. Bull. Amer. Mus. Nat. Hist., **76**: 151-229.

TATE, G. H. AND C. B. HITCHCOCK

1930. The Cerro Duida Region of Venezuela. Geogr. Rev., **22**: 31-52, 3 sketches, 16 photos, 1 text map.

TAYLOR, EDWARD H.

1944. The Hylid Genus *Acrodytes*, with Comments on Mexican Forms. Sci. Bull. Univ. Kansas, **30** (6): 63-68, pl. IX, figs. 1-4.

1951. Two New Genera and a New Family of Tropical American Frogs. Proc. Biol. Soc. Washington, **64**: 33-40.

1952. The Frogs and Toads of Costa Rica. Sci. Bull. Univ. Kansas, **35** (5): 577-942, figs. 1-69.

TAYLOR, EDWARD H. AND DORIS COCHRAN

1953. Frogs of the Family Centrolenidae from Brazil. Sci. Bull. Univ. Kansas, **35** (15): 1625-1656, figs. 1-7, map.

TEST, F. H.

1956. Two New Dendrobatid Frogs from Northern Venezuela. Occ. Pap. Mus. Zool. Univ. Michigan, no. 577:1-9.

THOMINOT, M. ALEXANDER

1884. Note sur un Batracien d'espéce nouvelle provenant de Panama. Bull. Soc. Philom. Paris, (7) **8**: 151-152.

TROSCHEL, F. H.

1848. Amphibien. *In*: Schomburgk, Richard, Versuch einer Fauna und Flora von British Guiana. Leipzig. Pp. i-viii + 533-1261.

TSCHUDI, J. J.

1838. Classification der Batrachier . . . Neuchatel. Pp. 1-100, pls. 1-6.

WALKER, CHARLES F. AND FREDERICK H. TEST

1955. New Venezuelan Frogs of the Genus *Eleutherodactylus*. Occ. Pap. Mus. Zool. Univ. Michigan, no. 561: 1-10.

WEINLAND, DAVID FRIEDERICH

1854. Über den Beutelfrosch. Archiv. Anat. Physiol. 1854: 449-477, pls. XVII-XIX.

WERNER, FRANZ

1899. Über Reptilien und Batrachier aus Columbien und Trinidad. Verh. zool.-bot. Ges. Wien., **49**: 470-484.

1899. Beschreibung neuer Reptilien und Batrachier. Zool. Anz., **22** (602): 479-484.

1903. Neue Reptilien und Batrachier aus dem Naturhistorischen Museum in Brüssel. Zool. Anz., **26** (691): 246-253.

1916. Bemerkungen über einige niedere Wirbeltiere der Anden von Kolumbien mit Beschreibungen neuer Arten. Zool. Anz., **47** (11): 301-304.

WIED-NEUWIED, MAXIMILIAN PRINZ VON

1822-1831. Abbildungen zur Naturgeschichte Brasiliens. Weimar, 15 pts., 83 pp., 90 pls.

WILLIAMSON, E. B.

1923. Notes on the Habitats of Some Tropical Species of *Hetaerina* (Odonata). Occ. Pap. Mus. Zool. Univ. Michigan, no. 130: 1-45.